ABSTRACT

Biopsychosocial Barriers, Motivational Interviewing, and Antiretroviral Medication Adherence

in Persons Living with HIV and AIDS

by

Qu'Nesha S. Hinton

April 2018

Director: Dr. Shari M. Sias

Department of Addictions and Rehabilitation Studies

Since the development of antiretroviral medications in the mid-1990s, treatment of

human immunodeficiency virus (HIV) infection has improved steadily and HIV is now

considered a manageable chronic condition with improved quality of life for those who are

medically adherent. However, medication regimens typically require near perfect adherence to

be effective and people living with HIV/AIDS (PLWHA) may experience a unique set of

biopsychosocial barriers that limit or inhibit their ability to be medically adherent. The purpose

of this study was to examine the influence of biopsychosocial factors and motivational

interviewing on antiretroviral medication adherence in people living with HIV/AIDS (PLWHA).

Specifically, this study explored how biopsychosocial barriers (i.e., physical health, mental

health, substance use, housing, transportation, and employment concerns) and motivational

interviewing predict antiretroviral medication adherence in PLWHA as measured by patients'

CD4 count and HIV viral load.

This study utilized archival data that was collected between July 2013 and July 2016 at

the Brody School of Medicine HIV Clinic and captured patients' biopsychosocial barriers, CD4

count and HIV viral load. A stratified sample of 210 patients was drawn from the archival data

for this study. Multiple logistic regression analysis showed that patients' CD4 count cut scores at intake made a significant contribution to the prediction of medication adherence as measured by PLWHA CD4 count cut scores at week 21, when controlling for patients' CD4 count cut scores at intake. Comparatively, results showed a statistical significance for the barrier substance use when examining antiretroviral medication adherence in PLWHA as measured by patients' HIV viral load cut scores at week 21. Further, a non-significant association between patients' CD4 cut scores at week 21 and patients' HIV viral load cut scores at week 21 in predicting antiretroviral medication adherence was found. The results of this study suggest that patients' starting CD4 count and substance use are important components that warrant further research for PLWHA. Further, this study has implications for healthcare professionals, counselors, and counselor educators related to substance use concerns for this specific population. Future research exploring substance use treatment and ARV medication adherence in PLWHA is suggested.

BIOPSYCHOSOCIAL BARRIERS, MOTIVATIONAL INTERVIEWING, AND

ANTIRETROVIRAL MEDICATION ADHERENCE IN PERSONS LIVING WITH HIV AND

AIDS

A Dissertation

Presented To

The Faculty of the Department of Addictions and Rehabilitation Studies

East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

Ph.D. Rehabilitation Counseling and Administration

by

Qu'Nesha S. Hinton

April 2018

BIOPSYCHOSOCIAL BARRIERS, MOTIVATIONAL INTERVIEWING, AND

ANTIRETROVIRAL MEDICATION ADHERENCE IN PERSONS LIVING WITH HIV AND

AIDS

by

Qu'Nesha S. Hinton

APPROVED BY:

DIRECTOR OF DISSERTATION: _____

Shari M. Sias, PhD

COMMITTEE MEMBER: _____

Paul J. Toriello, RhD

COMMITTEE MEMBER: _____

Stephen Leierer, PhD

COMMITTEE MEMBER: _____

Robert Campbell, EdD

CHAIR OF THE DEPARTMENT OF ADDICTIONS

AND REHABILITATION STUDIES:_____

Paul J. Toriello, RhD

DEAN OF THE GRADUATE SCHOOL: _____

Paul Gemperline, PhD

DEDICATION

The Vision

      The vision for this work is dedicated to my great-grandparents William and Mary. I cannot imagine that two sharecroppers from Eastern North Carolina could dream of raising a doctor, yet here I stand. You two laid the foundation for who I am today. You instilled the value of an education and helped me to see all the possibilities of who I could become. You ensured that whenever I returned from school, my first priority was to complete my homework. You encouraged me to go further, achieve more, and above all remain humble. Most importantly, you introduced me to my faith in God. It was that faith that brought me through the roughest days of this journey and it will be faith that carries me through the rest of life. For that, I am forever grateful.

The Inspiration

      The mission of this work is dedicated to my godbrother Michael. As an adult, I now understand that you were an amazing kid. You taught me what it means to fight hard but love harder. You persevered through many challenges, despite the odds being stacked against you. You are missed. It is your *life* that has inspired my work. I hope to serve others through this research.

The Purpose

      The purpose of this work is dedicated to those persons with HIV who are no longer with us. Many of you fought valiantly in silence. I chose to listen to your legacy. Your voices ring clear and remind me that there is still work to be done. I hope this work honors you.

ACKNOWLEDGMENTS

There are so many people who have been instrumental to my journey, I am not sure where to begin! I want to start in the only way I know how and that is by giving honor to God. I am able to write this today because I know that without Him I would not have made it this far.

To my grandparents (Johnny and Mary) – words cannot begin to explain my heart for you two! Thank you for every home-cooked meal and word of encouragement. To my parents (Michael [Ramona] and Michelle [Joe]) – you have seen the best and worst of me over the past four years of this journey. Thank you for your unconditional love and patience with me. To all of you, I promise I will not go back to school full-time for another degree!

To my early educators – thank you. You challenged me to be more than average. You saw something in me well before I could. To East Carolina University and the Department of Addictions and Rehabilitation Studies – thank you for a great six years. To each professor in DARS – thank you for pushing me to be a better student, professional, and person. A special thanks to Mrs. Judy and Mrs. Cathy for your consistent awesomeness!

To my committee – I cannot believe how this journey has come full circle. Each of you saw the woman who started the program compared to the one who finished. I am grateful for the guidance and mentorship of my committee chair, Dr. Shari Sias. Thank you for taking the opportunity to learn and appreciate my working style. I am forever grateful for your patience, for I know I tested it a few times! Dr. Toriello – thank you for pushing me to find my voice! Dr. Leierer – thank you for every weekend statistics session and random conversation about sports and jazz. Dr. Campbell – thank you for always being kind and teaching me what it means to be still, even when life becomes hectic. I could not have asked for a better committee!

To my mentors Drs. Virginia Hardy and Sherrá White – thank you for paving the way for me. I will never forget our conversations and reminders that this journey is so much bigger than me. To my PhD peeps – thank you so much! You have listened to every complaint, supported me through every fear, and celebrated every joy. For those who finished before me, thank you for your mentorship and reassurance that things get better. For those who are still grinding, YOU GOT THIS! Know that I am here to return the favor whenever you need. To Emily and Alexis – I am so excited you two are starting your journey. I am rooting for you both and know that I am here to offer support when needed!

To my "quad" (Amber, Ebony, Ray, and Raymond) – we made it! Thank you for supporting me through every late-night cry session, early morning hype fest, and midday revamp! I cannot begin to explain how AMAZING you all have been throughout this process. To you four as well, though I will never stop learning, I will not go back to school full-time – well at least not in the immediate future.

To my sister Autumn and my younger cousins – I love you all so much and I cannot wait to see where life takes you. This is for you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION

Introduction

This chapter provides an introduction for the study investigating the influence of biopsychosocial barriers to care and the use of motivational interviewing as a treatment modality on antiretroviral medication adherence for people living with human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) in a multidisciplinary medical healthcare setting. In this chapter the background for the current study, the statement of the problem, the study rationale, the research questions, the study significance, the operational definitions, and a brief review of the chapter are provided.

Background to the Study

The human immunodeficiency virus (HIV) progressively weakens the immune system by attacking the body's natural defense mechanisms. Further, HIV targets cluster of differentiation 4 (CD4) white blood cells and uses these cells to replicate and spread throughout the body. Cluster of differentiation 4 cells are responsible for protecting the body from illness and individuals without HIV have a CD4 count of approximately 500 to 1,200 cells in a given sample of blood (HIV.gov, 2017e). Once HIV enters the body, the virus begins to attack and destroy CD4 cells. As the number of CD4 cells decrease, the risk of seropositive (i.e., HIV-positive) individuals becoming sick from opportunistic infections increases (AVERT.org, 2018a).

Cluster of differentiation 4 count is also indicative of disease progression and suggests that individuals with HIV and a CD4 count below 200 have acquired immunodeficiency syndrome (AIDS; HIV.gov, 2017b). Individuals with AIDS have the highest risk of dying from an opportunistic infection such as tuberculosis (TB) or pneumonia, especially when antiretroviral (ARV) medications are not taken. However, modern advances in HIV prevention and treatment

(e.g., rapid HIV testing and antiretroviral medications) have dramatically reduced the amount of AIDS-related deaths worldwide. However, HIV and AIDS remain a major public health concern. Approximately 17 million people worldwide are unaware of their seropositive status, and many more do not have access to HIV testing services (HIV.gov, 2017f; Joint United Nations Programme on HIV/AIDS [UNAIDS], 2016).

Prevalence of HIV/AIDS

HIV/AIDS Worldwide. Scientists believe the origins of HIV can be traced to Kinshasa, Democratic Republic of Congo (AVERT.org, 2018c). Specifically, scientists postulate a chimpanzee version of the virus called simian immunodeficiency virus was transmitted through contact with contaminated chimpanzee blood when humans hunted these primates for meat (Centers for Disease Control and Prevention [CDC], 2018g). Since the discovery of HIV in the early 1980s, nearly 78 million individuals have been diagnosed (HIV.gov, 2017f; Information Evidence and Research, 2016). As of 2014, over 30 million people have died from AIDS-related illnesses (World Health Organization [WHO] & Oatway, 2009). Today, more than 36 million people are *living* with HIV/AIDS worldwide (WHO, 2017).

HIV/AIDS in the United States. Characteristics of what would later be defined as AIDS were first seen in the United States in June of 1981 when rare cases of *Pneumocystis carinii pneumonia* (PCP) were reported for five previously healthy young men in Los Angeles (CDC, 2001). Further, groups of men in New York and California were being diagnosed with an aggressive cancer known as *Kaposi's Sarcoma* (HIV.gov, 2016). By the end of 1981, among gay men, there was a total of 270 reported cases of severe immune deficiency, of which 121 were deceased (HIV.gov, 2016). Since then, more than 650,000 people have died of AIDS-related illnesses in the United States (AVERT.org, 2018d). Presently, over one million people are living

with HIV in the United States (CDC, 2018d). Nationwide there are approximately 50,000 individuals who receive a diagnosis of HIV each year (CDC, 2018d).

Compared to global statistics, the United States represents a small portion of the overall HIV/AIDS epidemic (AVERT.org, 2018d). Historically, death rates from epidemics are higher in areas that are heavily populated as infectious diseases are able to spread quicker and easier when people live in close proximity, and the same is true of HIV/AIDS (Dyson, 2003; Population Action International, 2011). Worldwide, HIV/AIDS is highly concentrated in urban areas (Dyson, 2003). The United States shows a similar trend as states with more urbanized areas report a higher prevalence of HIV/AIDS (CDC, 2018h). However, in the United States, the prevalence of HIV/AIDS is geographically concentrated in the Northeast and South, which includes over half (n = 26) of the states in the country (CDC, 2018h). By 2010, the estimated number of people living with HIV/AIDS (PLWHA) was highest in the South as compared to other regions in the United States (CDC, 2018h). Additionally, the South accounts for nearly half, (49%), of all new HIV infections in the United States (AVERT.org, 2018d).

HIV/AIDS in North Carolina. According to the 2010 U.S. Census, North Carolina is the 10th most populous state in the nation as well as one of the most rapidly growing states (North Carolina Department of Health and Human Services [NCDHHS], 2012). North Carolina reports having more than 29,000 people diagnosed and living with HIV with nearly five percent of these being newly diagnosed cases (NCDHHS, 2017). Furthermore, in 2013 North Carolina ranked ninth in the United States for the highest number of HIV diagnoses with more than 1,500 cases (CDC, 2017a). While geographical location underscores the breadth of the HIV/AIDS epidemic, there are certain individuals who are disproportionally affected by HIV/AIDS when compared to their counterparts.

Special Populations

Human immunodeficiency virus affects individuals across all sociodemographics. However, certain populations are identified as high-risk groups. For instance, a significant portion of PLWHA reside in low- to middle-income countries (UNAIDS, 2017). According to the World Health Organization (2016), an estimated 2 million of HIV cases are new diagnoses, which includes more than 220,000 children aged 15 years old or younger. The sub-Saharan African region represents the majority of newly diagnosed HIV cases with close to 26 million people living with HIV (WHO, 2017).

Women, Pregnant Women, and Children. Women, particularly young women and adolescent girls, have a disproportionately higher risk of HIV infection than men (AVERT.org, 2018e). Worldwide, women represent 17.4 million of those living with HIV, with the majority (80%) living in the sub-Saharan African region (WHO, 2016b; AVERT.org, 2018e). Explanations for these global trends include: (a) lack of education, (b) lack of access to healthcare, (c) lack of access to HIV testing and counseling, (d) gender inequality, and (e) intimate partner violence (AVERT.org, 2018e).

In the United States, approximately 25% of people living with HIV are women (CDC, 2018f). Similarly, women account for 22% of new HIV diagnoses in North Carolina (NCDHHS, 2016). Women of color, particularly African American and Hispanic/Latina, disproportionally represent the majority of women living with HIV in the United States (CDC, 2018f). Explanations for trends in the United States parallel the socio-economic and institutional barriers seen globally (Henry J. Kaiser Family Foundation, 2014).

Mother-to-child transmission of HIV occurs when a seropositive mother passes the HIV infection to her child during pregnancy, labor, delivery, or through breastfeeding (AIDSInfo,

2017). Globally, 1.8 million children (15-years-old and younger) are living with HIV after becoming infected by seropositive mothers (HIV.gov, 2017f). Again, most of these children live in sub-Saharan Africa (HIV.gov, 2017f).

In the United States, 73% of children diagnosed with HIV in 2014 acquired the infection by mother-to-child transmission (CDC, 2018i). In North Carolina, roughly 400 women of child-bearing age are diagnosed with HIV (NCDHHS, 2012). In 2007, North Carolina implemented preventative measures that required HIV testing for pregnant women at the first prenatal visit and in the third trimester, which helps reduce the likelihood of perinatal HIV transmissions (NCDHHS, 2012). In 2014, there were no reported cases of mother-to-child transmission of HIV (NCDHHS, 2016).

Gay, Bisexual, and Men Who Report Having Sex with Men (MSM). Gay, bisexual, and men who report having sex with men (MSM) continue to experience the greatest prevalence of HIV (HIV.gov, 2017g). In 2014, this subpopulation represented an estimated 83% of new HIV diagnoses among all males age 13 and older in the United States (CDC, 2018e). One explanation for this rate is that approximately 1 in 7 of men falling into this category are unaware of their seropositive status (CDC, 2018e). Additionally, African American and Hispanic/Latino gay, bisexual or MSM represent a disproportionate number of seropositive individuals (CDC, 2018d).

For the state of North Carolina, 79% of new diagnoses were among gay, bisexual, and MSM adult/adolescent males (NCDHHS, 2012). Most individuals comprising this subpopulation acquire HIV through unprotected anal sex with an HIV-positive individual (CDC, 2018e). Unprotected anal sex, particularly receptive anal sex, is the riskiest type of sexual behavior responsible for the transmission of HIV (HIV.gov, 2017c).

Minorities. As previously discussed, individuals of color have higher rates of HIV infection in the United States. For example, Hispanics/Latinos represent approximately 17% of the total United States population; however, this group accounts for roughly 24% of all new HIV diagnoses (CDC, 2018a). Contributing factors of higher HIV prevalence rates in Hispanic/Latino communities include: (a) higher rates of other sexually transmitted illnesses (STIs), (b) cultural barriers (e.g., stigma, discrimination, language barriers), and (c) structural barriers (e.g., poverty, limited access to healthcare, and lower educational level; CDC, 2018a). Specifically, this group represents more than 8% of new HIV diagnoses in North Carolina (National Latino AIDS Awareness Day, n.d.).

When compared to other races and ethnicities, African Americans/Blacks represents the highest proportion of new HIV diagnoses and persons living with HIV, despite representing only 12% of the U.S. population (AVERT.org, 2018d; Henry J. Kaiser Family Foundation, 2017). Additionally, this population disproportionally represent the largest group of individuals ever diagnosed with AIDS (CDC, 2018d). One explanation for this trend is African Americans typically have sex with partners of the same racial/ethnic community, which increases the likelihood of acquiring the HIV infection with each new sexual partner (CDC, 2018d). In North Carolina, the prevalence of African Americans living with HIV is 6.9 times higher for males and 14.4 times higher for females when compared to their Caucasian counterparts (AIDSVu.org, n.d.).

Age Differences. Similar to trends seen in gender, sexual orientation, and minority status, HIV/AIDS is not evenly distributed among age groups. For instance, 670,000 adolescents and young people ages 15 to 24 worldwide were newly infected with HIV in 2015 (United Nations International Children's Emergency Fund, 2016). Adolescent girls and young women,

6

particularly those in southern Africa, are disproportionally affected with this group representing 390,000 cases of new HIV infections in 2015 (UNAIDS, 2016).

In the United States, 2014 data suggests youth ages 13 to 24 represent 1 in 5 new HIV diagnoses (American Foundation for AIDS Research, 2017). Of the United States youth diagnosed with HIV, 80% identify as gay/bisexual males with the majority (55%) being gay/bisexual African Americans males (CDC, 2018c). Factors contributing to high prevalence rates for this age group include lack of sex education, low rates of condom use during sexual intercourse, low rates of STI testing, and increased stigma around HIV (CDC, 2018c).

Due to the advent and use of antiretroviral medications to treat HIV, individuals with HIV/AIDS are living longer (AVERT.org, 2018b). Globally, 17% of PLWHA are 50 years of age and over, with rates higher in high-income countries that utilize ART to treat HIV (UNAIDS, 2016). Interestingly, men account for a higher proportion of PLWHA, despite their naturally higher mortality rates (UNAIDS, 2016). Older adults (people age 50 and over) account for 17% of new HIV diagnoses (CDC, 2018b). Furthermore, 40% of people in this age group are diagnosed with AIDS, suggesting the diagnosis occurs later in the course of their infection (CDC, 2018b). One explanation for these trends include the lack of knowledge about HIV of older adults compared to their younger counterparts (UNAIDS, 2016). Many older adults are sexually active and have the same risk factors for STIs; however, healthcare professionals are less likely to discuss sexual activity with this population (CDC, 2018b).

Worldwide the risk of HIV infection often peaks in adulthood (UNAIDS, 2016). This trend is especially true among men, where half of new infections occur in men age 30 to 49 (UNAIDS, 2016). In 2015, individuals age 25 to 49 represented 60% of the diagnoses of HIV infection in the US (CDC, 2017a). As a global trend, rates of new HIV infections have plateaued

following a decade of steady decreases for adults aged 25 to 49 (UNAIDS, 2016). This trend is attributed to a lack of comprehensive HIV prevention and treatment programs that address biopsychosocial barriers such as access to healthcare, gender equality, or stigma of HIV (UNAIDS, 2016).

HIV/AIDS and the Cost to Society

As previously discussed, many people living with HIV or at risk for HIV lack access to prevention, treatment, and continued care (UNAIDS, 2017; HIV.gov, 2017f). Additionally, problems arise when the number of individuals in need of HIV treatment services exceeds the number of resources available. One report estimates a nine-billion-dollar gap in need versus resources to provide HIV treatment (UNAIDS, 2017). Furthermore, there has been a decline in donor funding at the global level for HIV/AIDS (AVERT.org, 2017; Henry J. Kaiser Family Foundation, 2016). In 2015, funding for global HIV needs decreased by 8% when compared to funding provided the previous year (AVERT.org, 2017). In response, many countries are relying on governments for domestic funding sources. However, low- and middle-income countries where HIV prevalence is the highest, still rely heavily on the support of international donors (AVERT.org, 2017). Comparatively, the United States has experienced an increase in federal funding in response to the rising financial demands for HIV/AIDS. In 2017, the United States appropriated $27.5 billion of an estimated $34 billion budget for domestic HIV efforts (Henry J. Kaiser Family Foundation, 2016). Interestingly, in the United States the smallest allocation (3%) of overall federal funding budget is for prevention efforts (Henry J. Kaiser Family Foundation, 2016).

HIV/AIDS and Antiretroviral Drugs and Therapies

Despite HIV prevalence and the cost to society, global and national efforts have increased the number of PLWHA receiving HIV/AIDS treatment (CDC, 2017a). According to the CDC (2017a) the incidence of new HIV infections in the United States has remained relatively stable over the past few years. This is due in large part to the advancements in medications, specifically antiretroviral (ARV) drugs, used to treat HIV/AIDS.

After discovering rare cases of *Pneumocystis carinii pneumonia* (PCP) and *Kaposi's Sarcoma* in 1981, scientists began researching ways to cure, what would later be known as HIV (HIV.gov, 2016). Though currently no cure exists, researchers have developed a host of ARV medications that treat the biological and physical symptoms associated with HIV infection. In 1986, the first clinical trial of an ARV begins with *zidovudine* or AZT (Bartlett, 2006). One year later, the United States Food and Drug Administration (FDA) approved AZT for the treatment of HIV/AIDS (HIV.gov, 2016). Since then, numerous gains were made, which have led to a decline in morbidity rates. One such advent is the highly active antiretroviral therapy or HAART, where multiple ARV medications are combined to create therapeutic treatment for HIV/AIDS (Palmisano & Vella, 2011). Today, more than 25 antiretroviral medications are FDA approved and used in the treatment of HIV (AIDSInfo, 2018).

Antiretroviral medications fall into one of six drug classes and are categorized by the mechanisms involved to fight HIV (AIDSInfo, 2018). These six classes include: (a) non-nucleoside reverse transcriptase inhibitors (NNRTIs); (b) Nucleoside reverse transcriptase inhibitors (NRTIs); (c) Protease inhibitors (PIs); (d) Fusion inhibitors (FIs); (e) CCR5 antagonists (CCR5s or entry inhibitors); and (f) Integrase strand transfer inhibitors (INSTIs; AIDSInfo, 2018). While the specific mechanisms are beyond the scope of this discussion, the

key takeaway is that each class of drugs works to *inhibit* the ability of the virus to replicate (U.S. Department of Veterans Affairs, 2016). Most of these medications are available in tablet or capsule form and several classes can be combined to form multi-class drug combinations (U.S. Department of Veterans Affairs, 2016). The United States Department of Health and Human Services provides a guideline on the use of ARV with adults and adolescents. Individuals initiating antiretroviral therapy (ART) typically begin with three ARVs from at least two different drug classes (AIDSInfo, 2018). The most common ART regimen includes the use of two NRTIs combined with either an INSTI, an NNRTI, or a pharmacokinetic-enhanced PI (AIDSInfo, 2018). Specific benefits associated with the use of ART includes obtaining and sustaining viral load suppression, increasing duration and quality of life, restoring and maintaining immunologic functioning, and reducing the transmission of HIV (AVERT.org, 2018b; AIDSInfo, 2018). Failure to adhere to an ART regimen, can reduce the expression of benefits, and can lead to negative health effects including having more side effects from ARV medications (HIV.gov, 2017a).

While the ART regimen helps manage the long-term effects of HIV/AIDS, individuals may experience adverse (side) effects soon after starting medications (Herrmann et al., 2013; Portillo, Holzemer, & Chou, 2007). As with all medicines, some individuals taking ARVs experience adverse side effects that may further deter medication adherence. Common adverse effects include but not limited to anemia, diarrhea, fatigue, rash, weight loss, as well as nausea and vomiting (Reust, 2011; HIV.gov, 2017a). Some individuals may experience more long-term adverse effects resulting in additional diagnoses such as insulin resistance, lipid abnormalities, and lactic acidosis (HIV.gov, 2017a).

There are also drug interactions to consider when using ARVs. Specifically, healthcare providers must consider how each drug will affect the other drug's therapeutic effect (AIDSInfo, 2018). Examples of medications that have drug interactions with ARVs are cardiac medications (e.g., warfarin), psychiatric medications (e.g., Ativan), and anticonvulsants (Reust, 2011). Individuals with multiple diagnoses that are treated with medications (e.g., HIV, hypertension, and epilepsy) may have more complex medication regimens as they work with their healthcare providers to reduce contraindications and adverse effects.

Typically, adverse medication side effects usually subside after a brief adjustment period, which will vary depending on the individual (HIV.gov, 2017a). However, these adverse effects and drug interactions may further complicate individuals' ability to maintain medication adherence. Further, ART is a lifelong treatment that requires behavioral changes (e.g., taking medications at the same time daily, monitoring and organizing medications) to sustain effectiveness (HIV.gov, 2017a). Failure to adhere or stopping treatment suddenly can negatively impact individuals' health and may lead to the development of drug-resistant strands of HIV (HIV.gov, 2017a). Finally, there are biopsychosocial challenges that threaten individuals' ability to maintain medication adherence.

Biopsychosocial Threats to Antiretroviral Medication Adherence

The following information introduces common biopsychosocial threats to medication adherence PLWHA may experience. Specifically, this section explores medical (i.e., physical health), mental health, substance use, housing, transportation, and employment concerns.

Medical. One of the salient challenges PLWHA face relates to physical health concerns. People living with HIV/AIDS may experience an array of symptoms depending on where they are in disease progression (Portillo et al., 2007). Physical symptoms of PLWHA vary from the

primary acute, to chronic asymptomatic, and finally to the severe immune comprised known as the acquired immunodeficiency syndrome (AIDS) stage. Some undiagnosed individuals are asymptomatic for years and seek medical attention only after severe and persistent, flu-like symptoms emerge (Evangelisto, 1996; CDC, 2018g). Other physical symptoms PLWHA may experience include pain, fever, constant fatigue, and chronic diarrhea (Evangelisto, 1996; Portillo et al., 2007). Research suggests that PLWHA may also encounter neurocognitive changes that can result in attention deficits, learning or memory difficulties, and impaired executive and motor function (Thames et al., 2012). Individuals that progress to the AIDS stage may encounter additional symptoms originating from opportunistic infections such as pneumonia (Portillo et al., 2007).

Physical health challenges may be more complicated for marginalized groups (e.g., racial/ethnic minorities). As previously discussed, African Americans disproportionately represent nearly half of all new HIV diagnoses in the United States (Sankar, Neufeld, Berry, & Luborsky, 2011). Additionally, the rate of new HIV infections among Hispanic/Latino is more than double for men and nearly four times for women than that of their Caucasian counterparts (Robinson, Sanders, & Boyd, 2012). Research suggests that stigma and other social factors such as poverty and social inequality contribute to HIV disparities (Buot et al., 2014; Earnshaw, Bogart, Dovidio, & Williams, 2013).

Mental Health. Research shows a high prevalence of mental illness among PLWHA (Galvan, Burnam, & Bing, 2003; Whetten et al., 2005). Bing et al. (2001) suggest that prevalence rates of depression for PLWHA are two to three times higher than that of the general population. Untreated depression can result in suicidal ideations, suicide attempts, and completed acts of suicide. Mental health may also be affected by the introduction of HIV/AIDS-related stigma.

HIV/AIDS-related stigma is due to the belief that PLWHA are solely responsible for their current condition (Hermann et al., 2013). One such example in popular culture is Charlie Sheen, who went public regarding his seropositive status. Many people blame Sheen for his status and refer to previous behaviors of drug use and promiscuity as explanations for possible exposure (Kim, 2015). HIV/AIDS-related stigma can also be internalized. Earnshaw and Chaudoir (2009) found that stigma affects PLWHA differently than those without HIV/AIDS. Specifically, internalized stigma increases stress, which in turn increases HIV-related symptoms and reduces mental health and social supports (Kalichman et al., 2009).

Substance Use. Many PLWHA may have substance use issues that predate their HIV/AIDS diagnosis (Pettinati, O'Brien, & Dundon, 2013; Whetten, Reif, Whetten, & Murphy-McMillan, 2008). Prevalence rates for substance use among PLWHA vary depending on one's definition, but generally, substance issues are believed to be high (Galvan et al., 2003; Bing et al., 2001). As a subpopulation, individuals whose primary means of drug use is intravenous injection have higher prevalence rates than those who use substances orally, smoking or inhaling (Bing et al., 2001). Additionally, PLWHA with a dual diagnosis of mental health and substance use disorders have a lower likelihood of obtaining and taking antiretroviral medication (Whetten et al., 2008).

Housing. Research suggests that individuals who lack stable housing or are homeless have higher rates of health concerns, including HIV (Milloy, Marshall, Montaner, & Wood, 2012). Specifically, PLWHA who are homeless or reside in marginal living conditions are more likely to delay initiation of HIV care as well as maintaining access to care (HIV.gov, 2017b). Furthermore, the prevalence of HIV for individuals who are homeless/marginally-housed is estimated to be five to ten times higher when compared to individuals who have stable housing

conditions (Milloy et al., 2012). United States housing experts suggest approximately half of PLWHA will need some form of housing assistance at some point after diagnosis (Nussbam, 2010). This barrier may be particularly true for PLWHA in the Southern region of the United States where HIV prevalence is higher (Reif, Golin, & Smith, 2005). The Housing Opportunities for Persons with AIDS (HOPWA) program is a federally funded initiative designed to help PLWHA address housing needs (U.S. Department of Housing and Urban Development, n.d.). Unfortunately, these programs have a limited reach and as Bennett (2010) points out, a housing need gap still exists for many individuals, particularly those in the South.

Transportation. Lack of reliable transportation is another barrier to medication adherence for PLWHA. Individuals with HIV/AIDS require regular visits to their primary healthcare provider, HIV care provider (if different from primary healthcare provider), and dentist (HIV.gov, 2017d). Transportation may be particularly problematic for individuals residing in rural areas who commute to the closest town or city to receive services (Ford & Spicer, 2012). Additionally, individuals who require wheelchair assistance or a medical transport may experience additional barriers when accessing care, as transportation options may be more limited due to the nature of their needs (Ford & Spicer, 2012). Furthermore, transportation is linked to other barriers to care (e.g., unemployment, unstable housing) suggesting a multifaceted challenge to medication adherence (Pellowski, 2013).

Employment. Another area of financial stability involves employment. Additionally, as ART helps PLWHA live longer, there is an increased need to secure employment. Employment has many benefits including income, social support, structure and helps PLWHA develop a sense of purpose (Basavaraj, Navya, & Rashmi, 2010). A major employment consideration is that of health benefits and how these benefits may affect PLWHA's ability to obtain necessary

14

treatment and medications (Dahlbeck & Lease, 2010). People living with HIV/AIDs may also struggle with deciding on whether to disclose their seropositive status to employers and co-workers. This can become important when PLWHA require a flexible work schedule as they may have frequent doctor visits or miss work because of adverse side effects of new medications (Dahlbeck & Lease, 2010).

Addressing Biopsychosocial Threats to Antiretroviral Medication Adherence

Given the factors associated with antiretroviral medication adherence success and failure, PLWHA require a continuum of care to support their ART adherence efforts (AIDSInfo, 2018). In response to this need, the National HIV/AIDS Strategy for the United States was developed. First introduced in 2010, the five-year National HIV/AIDS Strategy for the United States was designed to improve the response to the HIV epidemic (Health Resources and Services Administration [HRSA], 2016). In July 2015, these strategies were updated to 2020 and identified four primary goals: 1) reduce new HIV infections; 2) increase access to care and optimize health outcomes for people living with HIV; 3) reduce HIV-related health disparities and health inequities; and 4) achieve a more coordinated national response to the HIV epidemic (HRSA, 2016).

Specifically, goal two identifies a sub-goal to "support comprehensive, coordinated patient-centered care for people living with HIV, including addressing HIV-related co-occurring conditions and challenges meeting basic needs, such as housing" (The Office of National AIDS Policy, 2015). One way to accomplish this goal is through case management. Case management entails a client-centered approach that facilitates access to and utilization of an array of biopsychosocial supports (Brennan-Ing et al., 2016). For PLWHA, case management can serve as a bridge that connects individuals to both HIV and non-HIV related resources (Brennan-Ing et

al., 2016). Ultimately, the goal of case management is to encourage and support the independent functioning (autonomy) of individuals (New York State Department of Health AIDS Institute, 2006).

While a number of HIV case management models exists, the literature supports the effectiveness of a strengths-based model (Gardner et al., 2005; Craw et al., 2008, Hoffman et al., 2017). A strengths-based case management approach allows individuals to identify internal strengths and apply these to obtain needed resources (Gardner et al., 2005). HIV specific case management sessions focus on establishing a relationship between the case manager and client, encouraging regular contact with HIV medical care provider, as well as identifying ways to overcome biopsychosocial barriers that hinder access to health care (Ko, Liu, Lai, Pai, & Ko, 2013). Additionally, using a strengths-based case management model, case managers assist individuals in "attaining client-specific goals by self-determination" (Ko et al., 2013, p. 392).

Theoretical Rationale

A source of support for PLWHA is a non-judgmental, patient-provider relationship that uses motivational approaches to influence positively medication adherence (AIDSInfo, 2018). Motivational interviewing is a non-confrontational, client-centered, treatment modality used to help individuals make behavioral changes (Rollnick & Miller, 1995). This modality can be incorporated into case management establish a foundation of trust and collaboration between case manager and client, particularly during the assessment phase (Tahan & Sminkey, 2012). Additionally, motivational interviewing has empirical support for its effectiveness in increasing motivation with implications of improving medication adherence (Hill & Kavookjian, 2012; DiIorio, Resnicow, McDonnell, Soet, McCarty, & Yeager, 2003; Thrasher et al., 2006).

Self-determination theory (SDT) is an empirically based theory that explores the interplay among motivation, fulfillment of basic human needs and overall wellbeing (Deci & Ryan, 1985a). This theory purports people have an innate tendency toward personal development and growth, which is achieved along a continuum of autonomy (Deci & Ryan, 1985a). Self-determination theory introduces a meta-theory that identifies three assumptions related to the organismic nature of the theory. Additionally, SDT includes six mini-theories that elaborate on the basic human needs and types of motivation. Chapter Two provides a more in-depth discussion of SDT and motivational interviewing.

Statement of the Problem

Since the development of antiretroviral therapies (ART) in the mid-1990s, treatment of HIV infection has improved steadily (AIDSInfo, 2018). With the advent and use of ART, HIV is now considered a manageable chronic condition (AIDSInfo, 2018). Continued improvements in ARV medications have improved the quality of life and longevity for PLWHA (Basavaraj et al., 2010; Herrmann et al., 2013). However, most HIV/AIDS medication regimens require near-perfect ($> 95\%$) adherence in order to be effective (Thames et al., 2012). Furthermore, failure to follow adherence recommendations can lead to additional health issues such as the transmission of antiretroviral-resistant strands of the virus to sexual partners (Thrasher et al., 2006). Nevertheless, less than one-third of PLWHA in the United States have viral load suppression (AIDSInfo, 2018).

A number of factors have been identified as predictors of adherence to ARVs. Specifically, patient variables (e.g., those mentioned in threats to medication adherence), clinical setting, and the patient-provider relationship, have all be identified as contributing factors to adherence (Machtinger & Bangsberg, 2006). As stated previously, a continuum of care is needed

to support the individual needs of PLWHA. Providing a continuum of care for PLWHA can be accomplished through the use of a multidisciplinary care model (Broeckaert & Challacombe, 2015). Research suggests PLWHA who obtain additional services (e.g., behavioral health services, case management) are up to three times more likely to remain in care than clients who do not obtain additional needed services (Broeckaert & Challacombe, 2015). Furthermore, there is clinical research that supports the inclusion of a pharmacist as a part of the multidisciplinary team to treat PLWHA (Broeckaert & Challacombe, 2015). Finally, fostering non-judgmental and supportive patient-provider relationship with the use of motivational strategies can positively influence medication adherence for PLWHA taking ARVs (AIDSInfo, 2018). This study explores the influence of motivational interviewing as a treatment modality in a multidisciplinary HIV/AIDS clinic focused on medication adherence as well as case management of biopsychosocial challenges to improve overall medication adherence for PLWHA.

Research Questions

This study addressed the following research questions:

(a) How do biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predict antiretroviral medication adherence in people living with human immunodeficiency virus and acquired immune deficiency syndrome as measured by patients' CD4 count cut score at week 21?

(b) How do biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predict antiretroviral medication adherence in people living with human immunodeficiency virus and acquired immune deficiency syndrome as measured by patients' HIV viral load cut score at week 21?

(c) Is there a statistically significant relationship between patients' CD4 cut scores at week 21 and patients' HIV viral load cut scores at week 21 in predicting antiretroviral medication adherence?

Definition of Terms

The following is an alphabetical list of terms relevant to the study.

1. *Acquired Immunodeficiency Syndrome (AIDS).* The final stage of HIV infection and is signified by a weakened immune system unable to fight off opportunistic infections or cancers.

2. *Antiretroviral (ARV) drugs.* The specific medicines designed to treat HIV infection (WHO, 2013).

3. *Antiretroviral therapy (ART).* The use of three or more ARV medicines taken in combination to achieve viral suppression. Synonyms are combination ART and highly active ART (HAART; WHO, 2013).

4. *Biopsychosocial approach and barriers.* An approach which "systematically considers biological, psychological, and social factors and their complex interactions in understanding health, illness, and health care delivery" (Engel, n.d., para 2).

5. *CD4 cell (T-cell).* A type of white blood cell that plays a major role in protecting the body from infection.

6. *CD4 count.* A lab test that measures the number of CD4 cells in a sample of blood and serves as a predictor of HIV progression. The CD4 count of an HIV negative individual in good health ranges from 500 cells/mm3 to 1,600 cells/mm3 (HIV.gov, 2017e).

7. *Case management.* A "collaborative process of assessment, planning, facilitation, care coordination, evaluation, and advocacy for options and services to meet an individual's and

family's comprehensive health needs through communication and available resources to promote quality, cost-effective outcomes" (Case Management Society of America, 2016, para 1)

8. *Human Immunodeficiency Virus (HIV)*. A virus that affect specific cells of the immune system, called CD4 (T-cells), and if left untreated can lead to *Acquired Immunodeficiency Syndrome* (AVERT.org, 2018a).

9. *Medication adherence.* Biological markers (CD4 counts, viral load) were used to measure medication adherence. Participants CD4 counts and viral load were measured at intake and again at week 21 and dichotomized for this study. The dichotomized CD4 counts cut-off scores were: ≥500 cells/mm^3 (1 – immunocompetent) or <500 cells/mm^3 (0 – immunocompromised). The dichotomized HIV viral loads cut-off scores were: ≥1,000 copies/mL of blood (1 – virologically unsuppressed) or <1,000 copies/mL of blood (0 – virologically suppressed).

9. *Motivational interviewing.* "A collaborative, goal-oriented style of communication with particular attention to the language of change. It is designed to strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion" (Miller & Rollnick, 2013).

10. *Viral load.* The amount of HIV in a sample of blood. High viral loads indicate that more copies of the virus exist in the body and the immune system is not fighting HIV as well (HIV.gov, 2017e).

11. *Viral load test.* A lab test that measures the number of HIV virus participles, or copies, in a milliliter of blood (HIV.gov, 2017e). A viral load test helps monitor the disease, guide treatment, and predict disease progression (Vajpayee & Mohan, 2011).

12. *Viral load suppression.* A very low viral load of less than 200 copies per milliliter of blood. Individuals with viral load suppression have a significantly reduced likelihood of transmitting HIV (HIV.gov, 2017e).

Justification and Significance of the Study

The purpose of this study was to explore the influence of biopsychosocial barriers and motivational interviewing on antiretroviral medication adherence to improve medication adherence for PLWHA.

Justification

Literature supports the success of ART for the management of HIV as a chronic illness (Palmisano & Vella, 2011). However, research also suggests ART's effectiveness is contingent on a strict medication adherence regimen (HIV.gov, 2017a). To foster medication adherence with this population, research encourages the use of non-judgmental, motivational strategies by members of a multidisciplinary team. Optimal treatment outcomes (e.g., undetectable viral loads of <20 copies/mL and increased CD4 counts of >500 cells/mm^3) are linked to medication adherence with case management to address biopsychosocial concerns that may pose as barriers to HIV/AIDS care (Broeckaert & Challacombe, 2015).

Significance

The significance of this study crosscut multiple areas for PLWHA and in the field of counseling. Specifically, the information could lend to treatment implications for PLWHA that improves their overall wellbeing. Additionally, this study could have training implications for use of motivational interviewing with PLWHA at the counselor and counselor education level. Finally, the results of this study expand the current body of research on the use of motivational interviewing with PLWHA in nontraditional counseling settings.

Chapter Summary

This chapter presented an introduction for the study investigating the influence of biopsychosocial barriers as well as the use of motivational interviewing on antiretroviral medication adherence for people living with human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) in a multidisciplinary medical healthcare setting. Additionally, Chapter One highlighted the prevalence of HIV/AIDS as well as the biopsychosocial of HIV on individuals and the community at large. Finally, this chapter provided the statement of the problem, research questions, operational definitions, and the study's significance at multiple levels. Chapter Two begins with a discussion of biopsychosocial barriers to medication adherence. Chapter Two also provides a review of Motivational Interviewing and Self-Determination Theory as well as introduce the relevant empirical research related to motivational interviewing and medication adherence for PLWHA.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The previous chapter discussed the use of motivational interviewing as a treatment modality to increase antiretroviral medication adherence for people living with human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS). Chapter Two begins by identifying biopsychosocial barriers that may influence adherence to antiretroviral medications for people living with HIV/AIDS (PLWHA). This chapter also contains an extensive review of motivational interviewing and self-determination theory, the theoretical framework for this study. A review of the literature concerning the application of motivational interviewing to improve medication adherence for PLWHA is also discussed.

Biopsychosocial Barriers to Antiretroviral Medication Adherence

Achieving adherence to antiretroviral medications (ARVs) is a critical determinant of positive long-term health outcomes for PLWHA. However, there are many factors such medical (i.e., physical health), social, and the patient-provider relationship, that influence adherence to ARVs (AIDSInfo, 2018). Furthermore, non-adherence is often a consequence of individuals experiencing one or more biopsychosocial barrier (e.g., gender-specific concerns, age, minority status; AIDSInfo, 2018).

Biopsychosocial barriers can be categorized as either individual or systemic. Barriers at the individual level reflect socioeconomic and psychosocial factors such as physical health comorbidity, mental health, or substance use concerns (Wawrzyniak et al., 2015). Larger, systemic level barriers are those that reflect HIV care systems and include things such as lack of transportation, employment status and unstable housing (Wawrzyniak et al., 2015; Colasanti, Stahl, Farber, del Rio, & Armstrong, 2017). Individual and systemic barriers can affect retention

in care for PLWHA. Retention is associated with higher rates of viral suppression as well as antiretroviral prescriptions and as a result, PLWHA experience fewer hospitalizations, AIDS-related illnesses, and have lower mortality rates (Colasanti et al., 2017). Though separate health behaviors, retention and medication adherence are interrelated (Holtzman, Brady, & Yehia, 2015). Specifically, retention in care increases the likelihood PLWHA are prescribed ARVs. Furthermore, retention and medication adherence share similar barriers that may affect HIV outcomes (e.g., CD4+ count and viral suppression; Holtzman et al., 2015).

Wawrzyniak et al. (2015) examined how individual and systemic barriers are associated with clinic attendance and virologic suppression in PLWHA. Participants (n = 444) were recruited from an HIV outpatient clinic in Miami-Dade County, Florida. Participants were categorized into one of three categories (regular, irregular, or non-attender) based on their number of clinic visits during a one-year period. The final sample consisted of 187 regular attenders, 191 irregular attenders, and 66 non-attenders with 80% of the sample representing African Americans and 60% of the sample earning less than $10,000 annually (Wawrzyniak et al., 2015).

Participants were administered a questionnaire that captured both individual and systemic barriers. Specifically, individual barriers were captured using the *Center for Epidemiologic Studies Depressive Scale* (depression); *Life Chaos Scale* (stability and predictability); *12-Item Short Form Health Survey* (perceived health status); *Medical Outcomes Study HIV Health Survey* (quality of life); *MOS Social Support Survey* (social support); *ACTG Adherence Questionnaire* (medication adherence); *Household Food Insecurity Access Scale* (food insecurity); *Addiction Severity Index Lite* (drug use); as well as caregiving responsibilities. Systemic barriers (e.g.,

patient-provider relationship, transportation issues), as well as demographic information (e.g., race/ethnicity, gender, education, income), were also collected (Wawrzyniak et al., 2015).

For each measure, barriers were categorized as either being present or absent. Continuous scales and categorical measures with more than one category were dichotomized. Additionally, participants' most recent HIV-1 viral load and CD4 counts were obtained from participants' medical records. Participants with a viral load of <20 copies per milliliters (mL) were classified as undetectable (i.e., virologically suppressed).

Differences between the three attendance groups were compared using ANOVA for continuous variables and Chi-square test for categorical measures. Wawrzyniak et al. (2015) found that non-attenders were more likely to indicate recent drug use and a lack of money to cover medical care and other expenses. At the systemic level, non-attenders were less likely to communicate with their HIV care provider and more likely to have transportation issues. Wawrzyniak et al. (2015) also compared participants who were virologically suppressed (undetectable) to those who were not. Participants who were detectable expressed higher rates of depressive symptoms, chaos, recent substance use as well as an overall lower quality of life when compared to participants who were undetectable. Additionally, participants who were detectable reported a statistically significant lower rate of medication adherence.

Furthermore, this study explored syndemic barriers. *Syndemic* refers to the synergistic effect of two or more conditions that contributes to the excess burden of disease (Wilson et al., 2014). Wawrzyniak et al. (2015) found a significant difference between groups in the number of individual and systemic-level barriers. Specifically, participants in the non-attenders group had significantly more individual-level barriers when compared to regular attenders and significantly more systemic-level barriers when compared to regular and irregular attenders. Additionally,

participants who were detectable had significantly more individual-level barriers than those who were undetectable.

Both individual and systemic-level barriers were associated were suboptimal clinic attendance and viral suppression. However, this study was not without limitations. One limitation is that individuals who refused to participate were not included in the study which introduces bias, particularly between the regular and irregular attender groups (Wawrzyniak et al., 2015). Additionally, this study was conducted at a clinic where patients represent a lower socioeconomic status. This population may inherently have more barriers when compared to individuals with a higher socioeconomic status limiting the interpretation of the study's results (Wawrzyniak et al., 2015). Though these study limitations exist, this study supports the idea that "co-occurring barriers to HIV medical care are additively associated with poorer retention in HIV care and increased viral loads…" (Wawrzyniak et al., 2015, p. 9).

In a similar study, Colasanti and colleagues (2017) used an exploratory study to assess individual and structural level barriers that affected retention in care for PLWHA. Participants (n = 59) were recruited from one of the largest HIV clinics in the southeastern United States that serves predominately minority and socioeconomically disadvantaged individuals. Participants were defined as either being *continuously retained* (attended two scheduled HIV provider visits during a 12-month period, n = 32) or *unretained* (n = 27). Participants grouped into the unretained category attended at least one HIV provider visit with a gap of at least seven months since their last visit and met one of the following criteria: gap of at least three months for ART, single re-enrollment visit during the 12-month period before current gap in care, or history of prior gaps (at least 12 months) since initial engagement in care.

Participants completed a survey tool that captured demographic information such as primary language, gender, race/ethnicity, sexual orientation and highest level of education. The survey also included the following scales and screeners: *General Self-Efficacy Scale* (self-efficacy); *Multidimensional Scale of Perceived Social Support* (perceived social support); *Connor-Davidson Resilience Scale, 2 item* (resilience); *The NIDA Quick Screen* (substance use); *Alcohol Use Disorder Identification Test* (alcohol use); and the *Patient Health Questionnaire* (depression). Finally, the survey asked about unmet needs (e.g., mental health/substance use treatment, food), transportation, health insurance status, financial and housing stability (Colasanti et al., 2017).

Colasanti et al. (2017) obtained current HIV-1 RNA level (i.e., viral load) and CD4 counts from participants' medical records. This study used a cutoff of <200 copies/mL to determine whether participants were virologically suppressed (yes/no). CD4 counts were recorded as cells/microliter. Using Chi-square and Mann-Whiney *U* tests to compare groups, differences were found between individuals engaged actively in HIV care versus those that were not. Specifically, Colasanti et al. (2017) study reported a higher prevalence of depression and alcohol/drug use among unretained participants. Participants in the unretained group also reported having more unmet needs (mental health/substance use treatment, housing, financial assistance, benefits, food, transportation) when compared to the continuously retained participants. Furthermore, unretained participants reported more financial instability (92.6% vs. 46.9% of continuously retained) and were more likely to not have money to address basic needs such as a food or housing (Colasanti et al., 2017).

One limitation of this study was the small sample size which limits the ability to determine the potential additive effects of individual and structural risks factors on retention.

Additionally, participants in the unretained group are subject to selection bias because they were recruited during re-engagement in care (Colasanti et al., 2017). These participants may not reflect the barriers and needs of individuals who are out of care completely. Despite these limitations, the study by Colasanti et al. (2017) underscores the need to have a model that predicts which patients may have poor retention rates based on individual and structural barriers to care.

Based on the literature introduced in Chapter One and above, the current study explored the following six factors: medical (i.e., physical health), mental health, substance use, housing, transportation, and employment concerns. Specifically, the current study explored how these biopsychosocial barriers predict antiretroviral medication adherence in PLWHA. The next section introduces self-determination theory as meta-theory, the six mini-theories of self-determination theory as well as the extensions and limitations of the theory.

Self-Determination Theory

Motivations explain behaviors and reasons to act. Popularized by Edward Deci and Richard Ryan (1985), self-determination theory (SDT) is an empirically based theory that conceptualizes the fulfillment of the basic human needs and the role of motivation as it relates to overall wellbeing. Specifically, SDT introduces an intersection between the concepts of innate intrinsic drives and needs as well as extrinsic influences such as external rewards or punishments (Kessler, 2013). Self-determination theory provides a meta-theory that describes an organismic approach to conceptualizing human motivation along with six mini-theories that further explicate intrinsic and extrinsic motivation.

Self-Determination Theory's Meta-Theory

Self-determination theory is an organismic theory that assumes a holistic perspective and explains humans' active nature and innate tendency towards growth (Brown & Ryan, 2004). Notable examples of organismic theories include Kurt Goldstein's (1939) organismic psychology, Jean Piaget's (1952) theory of cognitive development, and Fritz Perls' (Perls, Hefferline, & Goodman, 1951) Gestalt therapy.

Underpinning the organismic nature of SDT are three main assumptions. The first claims that individuals are not passive agents situated within their environment (Deci & Ryan, 1985a). Individuals do not just react to influences; instead, they are able to proactively respond to and act on intrinsic or extrinsic forces (Deci & Vansteenkiste, 2004). Autonomy or self-determination, is a fundamental concept of SDT that describes individuals' ability to "act in a volitional manner" (Soenens & Vansteenkiste, 2010). Self-determination theory assumes individuals take an active role in their lives and participate in different activities that satisfy needs, encourage curiosity, and facilitate growth (Vansteenkiste, Williams, & Resnicow, 2012). Intrinsic motivation is one such example that demonstrates individuals' propensity to engage actively in pursuits they find inherently stimulating to facilitate growth (Deci & Ryan, 1985a).

The second assumption of SDT is that individuals naturally desire to grow, develop, and function in an integrated manner (Deci & Vansteenkiste, 2004). Drawing from organismic theory, SDT supposes that individuals have the capacity to obtain higher levels functioning (Sheldon, Williams, & Joiner, 2003b). This inherent tendency to strive for higher levels of functioning is an organismic theory concept known as the organismic valuing process. The organismic valuing process describes a universal human experience responsible for greater well-being caused by humans' social environment that supports opportunities for growth (Brown &

Ryan, 2004; Sheldon, Arndt, & Houser-Marko, 2003a). Organismic theory also posits that humans inherently know what they need in order to achieve optimal levels of well-being (Brown & Ryan, 2004). Again, the social environment plays an instrumental role in supporting or weakening humans' ability to fulfill psychological needs (Vallerand, Pelletier, & Koestner, 2008; Brown & Ryan, 2004).

Finally, the third assumption SDT suggests is that growth tendencies do not occur spontaneously; rather, they necessitate the continuous support from social environments (Vansteenkiste & Ryan, 2013). Specifically, SDT proposes that social environments should facilitate the fulfillment of three basic needs: (a) competence, (b) autonomy, and (c) psychological relatedness (Deci & Ryan, 2000). Thus, optimal wellbeing occurs when these three needs are satisfied. Conversely, individuals who are unable to fulfill these needs tend to have negative biopsychosocial outcomes (Deci & Vansteenkiste, 2004).

An Overview of Self-Determination Theory's Mini-Theories

The six mini-theories – Cognitive Evaluation Theory, Organismic Integration Theory, Causality Orientations Theory, Basic Psychological Needs Theory, Goal Content Theory, and Relationships Motivation Theory – represents the formal theory of SDT. These mini-theories combine decades of research that explain human motivation and personality (Vansteenkiste, Niemiec & Soenens, 2010). For parsimony, a review of the mini theories' concepts relevant to the present study is provided. For a comprehensive discussion, see Ryan and Deci's (2017) latest book called *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*.

Cognitive Evaluation Theory. The cognitive evaluation theory (CET) involves intrinsic motivation and specifies the social contexts in which it is influenced (Deci & Ryan, 1985a).

Intrinsic motivation describes an inherent drive to participate in activities of interest that afford opportunities to master challenges (Deci & Ryan, 1985b). The CET outlines three propositions that further describes how intrinsic motivation works. The first proposition suggests that individuals have a need to be self-determining or autonomous (Deci & Ryan, 1985a). Deci and Ryan (1980) conceptualize this need as individuals' perceived locus of causality. To expand, the perceived locus of causality asks from where (intrinsically or extrinsically) motivations are originating. Additionally, this proposition suggests that the presence of external rewards such as money reduces or undermines intrinsic motivation (Deci, 1975).

Deci and Ryan's (1980, 1985a) second proposition suggests that individuals need to feel competent. Essentially, changes in individuals' perception of their levels of competence can influence their intrinsic motivation (Deci & Ryan, 1980). Factors that typically increase individuals' perceived competence include feedback, praise, and self-determination regarding the chosen activity (Deci & Ryan, 1980). Likewise, individuals experience perceived incompetence when they encounter a task that they cannot master (Deci & Ryan, 1985a). In short, a greater perceived competence enhances intrinsic motivation, while perceived incompetence decreases intrinsic motivation (Deci & Ryan, 1985a).

The third proposition of the CET considers the social context of events and introduces three aspects, informational, controlling, and amotivating, that are relevant to the "initiation and regulation of behavior" (Deci & Ryan, 1985b, p. 111). Informational aspects of social environments promote self-determined functioning by providing individuals with choices. This aspect enhances intrinsic motivation by fostering an internal perceived locus of causality as well as increasing perceived competence (Deci & Ryan, 2002). Comparatively, controlling aspects of social environments create an external perceived locus of causality due to pressures that

prescribe individuals' actions, thoughts, and emotions. Because controlling aspects promote

control-determined functioning, intrinsic motivation is undermined (Deci & Ryan, 1985a). Last,

amotivating aspects produce a decrease in functioning through perceived incompetence, thus

undercutting intrinsic motivation and supporting amotivation (Deci & Ryan, 1985a).

Finally, CET suggests that autonomy and competence work together. Specifically, a

perception of competence must be accompanied by a sense of self-determination (autonomy) to

increase or maintain intrinsic motivation (Deci & Ryan, 2000). In sum, CET provides a

framework that identifies two specific processes, perceived locus of causality and perceived

competence that can either undermine or enhance intrinsic motivation.

Organismic Integration Theory. The second mini-theory, organismic integration theory

(OIT), focuses on extrinsic motivation and the different forms it can assume. Extrinsic

motivation involves an external motivator and typically serves a purpose (e.g., obtaining

rewards, avoiding punishments; Kessler, 2013). Organismic integration theory categorizes the

different forms of regulation within extrinsic motivation as external, introjected, internalization,

and integrated regulation. Each of these regulations differ on associated processes and perceived

locus of control (Niemiec & Ryan, 2009). The details of the different forms of regulation are

explained in detail later in the chapter.

Causality Orientations Theory. The causality orientations theory (COT) explains

individuals' "motivational orientations toward the social world" (Deci & Ryan, 2002, p. 21).

Deci and Ryan (1985) present three types of causality orientations – autonomy, control, and

impersonal – that describe individuals' differences in interpreting or regulating behaviors.

Simply put, individuals have a primary way in which they initiate or regulate behaviors

(Deponte, 2004). Causality orientations lie on a continuum of self-determination (Deponte,

2004). However, Deci and Ryan (1985b, 1985a), conceptualized each orientation as a separate entity that individuals gravitated towards based on their interpretations of initiating or regulating behaviors. Causality orientations are learned and cultivated in early childhood. Specifically, the environment parents and caretakers provide for their children typically determines how individuals develop their causality orientation (Deci & Ryan, 1985a).

An autonomous orientation occurs when individuals' choices are based on their interests and awareness of psychological needs (Deci & Ryan, 1985a). Individuals with an autonomous orientation perceive their behaviors as self-initiated and feel a sense of responsibility for their development (Deponte, 2004; Koestner & Zuckerman, 1994). Further, they view initiating or regulating events as informational given that these events support their autonomous choices (Deci & Ryan, 1985b). In short, individuals with this orientation are more likely to be intrinsically motivated and feel that their needs for autonomy and competence are supported with minimal to no external rewards (Deci & Ryan, 1985b).

Individuals with a control orientation perceive rewards as the primary control for their choices (Deci & Ryan, 1985b). Control-oriented individuals may feel pressure from their environments and are influenced by feelings of guilt, shame, social norms, or cultural values (Deci & Ryan, 1985a; Olesen, Thomsen, Schnieber, & Tønnesvang, 2010). When this orientation type is dominant, individuals behave in a way that is socially acceptable and extrinsic rewards have a more salient role in determining actions (Deci & Ryan, 1985b). Additionally, individuals with a control orientation are more likely to view initiating or regulating events as controlling (Deci & Ryan, 1985a).

Finally, the impersonal orientation originates when individuals' perceive themselves as incompetent (Deci & Ryan, 1985a). Individuals develop a sense of helplessness because of a

33

perceived lack of control over internal or external forces (Deponte, 2004). Furthermore, these individuals perceive initiating or regulating behaviors as amotivated and are more likely to be amotivated themselves (Deci & Ryan, 1985b; Deci & Ryan, 1985a). Specifically, impersonal oriented individuals may experience more apprehension about encountering new events and may become depressed about their inability to master current challenges (Deci & Ryan, 1985b).

Basic Psychological Needs Theory. The concept of need satisfaction is explained using the basic psychological needs theory (BPNT). This theory clarifies the relationship between individuals' psychological needs and their well-being (Gunnell, Crocker, Wilson, Mack, & Zumbo, 2013). Needs are innate, motivating forces that directly affect well-being (Deci & Ryan, 2002). Well-being describes individuals' ability to be fully functioning (Deci & Ryan, 2002). The BPNT identifies three basic psychological needs – autonomy, competence, and relatedness – that are culturally universal and essential for "human thriving" (Chen et al., 2015, p. 217). Specifically, SDT defines needs as "innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being," (Deci & Ryan, 2000, p. 29).

Autonomy refers to the feeling of being in control of one's behaviors (Gunnell et al., 2013). Self-determination theory posits that fulfilling the need of autonomy promotes better overall psychological well-being in individuals (Wichmann, 2011). Additionally, attending to this need increases individuals' ability to better regulate ways in which they behave, think, and feel (Deci & Ryan, 2000). Furthermore, supporting autonomous behaviors increases the likelihood of integrated regulation occurring (Deci & Ryan, 2000). Competence entails being able to effectively deal with one's environment (Visser, 2010; Kessler, 2013). Autonomy involves experiencing novel and challenging activities and being able to master them successfully (Kessler, 2013).

Like autonomy, competence is integral to the process of internalization (Ryan, Patrick, Deci, & Williams, 2008). Competence also plays a role in the integration process, in that individuals sustain/maintain behaviors they now value as important (Ryan et al., 2008). Finally, relatedness describes individuals' felt sense of connection and belonging to others (Visser, 2010). Satisfaction in the need for relatedness encourages internalization of certain values, which in turn increases motivation (Niemeic & Ryan, 2009). Collectively, these three factors have predictive value in determining the overall wellbeing of individuals as their presence is indicative of fulfillment of needs. Failing to address any or all of these needs can lead to a decrease in self-motivation (Visser, 2010).

The BPNT also identifies three parallel social environments that either support or thwart the needs of autonomy, competence, and relatedness. Autonomy-supportive environments encourage autonomy in comparison to environments that are controlling. Environments that provide structure fulfills the need of competence in contrast to social contexts that are chaotic. Finally, social contexts that offer warmth and responsiveness, rather than cold and neglectful, support the need of relatedness (Vansteenkiste et al., 2010).

Self-determination theory suggests the more basic psychological needs met, the higher optimal functioning individuals experience (Deci & Ryan, 2002). Therefore, if any of these three needs are thwarted, individuals can experience threats to their overall well-being. Initially, individuals keep pursuing need fulfillment despite repeated experiences of need thwarting (Vansteenkiste et al., 2010). Over time, individuals tend to develop maladaptive ways of coping when any one of their basic needs are repeatedly thwarted (Deci & Ryan, 2000). Specifically, individuals may adopt need substitutes such as material success or social approval, which have short-lived effects and fail to satisfy basic psychological needs (Vansteenkiste et al., 2010).

Goal Contents Theory. Goal contents theory (GCT) explains how content goals can lead to differential outcomes that affect overall wellbeing of individuals (Gunnell, Crocker, Mack, Wilson, & Zumbo, 2014). Goals focus on the expectations individuals anticipate in response to their participation in activities (Gunnell et al., 2014). Specifically, GCT distinguishes between intrinsic goals and extrinsic goals. Content of intrinsic goals include, personal growth, affiliation, and community contribution (Deci & Ryan, 2000). Intrinsic goals fulfill individuals' personal interests and generally lead to basic need satisfaction (Sebire, Standage, & Vansteenkiste, 2009; Vansteenkiste, Lens, & Deci, 2006).

Comparatively, extrinsic goals such as recognition and financial success are pursued to obtain external indicators of worth (Gunnell et al., 2014). Additionally, extrinsic goals do not originate from individuals' personal interests neither do extrinsic goals contribute to individuals' development (Sebire et al., 2009). Furthermore, GCT posits that the content of goals are predictors of behaviors and overall wellbeing with intrinsic goal contents offering more positive outcomes such as increased self-determination motivation and overall better wellbeing (Gunnell et al., 2014).

Relationships Motivation Theory. The sixth mini-theory, relationships motivation theory (RMT) addresses the concept of relatedness. As previously mentioned, the desire to feel connected to others is a basic psychological need that, if unfulfilled, can have detrimental effects on individuals. As a result of this fundamental need, individuals actively seek out others to experience a sense of belonging (Deci & Ryan, 2014). However, RMT acknowledges that not all social interactions result in meaningful exchanges between individuals (Deci & Ryan, 2014).

To explain this phenomenon, RMT suggests that relatedness alone is not sufficient to produce high-quality relationships (Hadden, Rodriguez, Knee, & Porter, 2015). The quality of

36

relationships increases when people concurrently experience satisfaction in their needs for autonomy and competence (Deci & Ryan, 2014). To expand, relationship autonomy describes an intrinsic desire to be involved in relationships rather than feeling coerced (Hadden et al., 2015).

Another concept of RMT is autonomy support, which refers to the "extent to which one feels that his or her relationship allows him or her to act and choose freely" (Hadden et al., 2015, p. 361). Generally, higher quality relationships are seen as having relationship autonomy (i.e., a genuine desire to be in relationships) and autonomy support (Deci & Ryan, 2014).

Additionally, RMT identifies competence support, the extent to which relationships "promotes a sense of efficacy and ability" (Hadden et al., 2015, p. 361). Individuals need to feel they are useful and contribute positively to relationships. Furthermore, this mini-theory underscores the element of mutuality in relationships. In essence, both partners in a relationship provide satisfaction of basic psychological needs for the other partner (Deci & Ryan, 2014). Mutuality leads to more satisfying relationships for both individuals involved. In sum, the highest quality personal relationships are those that support satisfaction for the needs of autonomy, competency, and relatedness.

Extensions of Self-Determination Theory

Autonomy and Antiretroviral Medication Adherence. The treatment of chronic illnesses, like HIV, require long-term pharmacotherapy (i.e., the use of medication(s) to treat illness; Brown & Bussell, 2011). However, one of the barriers to chronic illness treatment is medication adherence. Research suggests individuals typically take about half of their prescribed medications (Brown & Bussell, 2011). Furthermore, research highlights that individuals take less than the amount necessary for effectiveness if medication regimens are two weeks or more (Dwyer, Levy, & Menander, 1986).

Williams, Rodin, Ryan, Grolnick, and Deci (1998) explored long-term medication adherence in a study grounded in the application of SDT. Specifically, William and colleagues (1998) were interested in the relationship between long-term medication and patients' perceptions of their healthcare providers' autonomy support. The hypothesis was that patients' medication adherence would be explained by patients' autonomous motivation.

Participants were 126 adults (75% women) from central North Carolina who were taking at least one prescribed medication. Additionally, participants had taken their prescribed medication for the past month and planned to continue taking medications for another month. Participants completed a structured 1-hour interview regarding their health status, medication regimen, relationship with medical provider, and adherence to medication regimen. Additionally, participants provided subjective ratings of their medication adherence. Finally, a pill count of the medication was performed at the initial interview as well as two weeks later during a self-report telephone interview (Williams et al., 1998).

Overall, participants rated themselves as relatively healthy with low severity health concerns. Using correlation, logistic regression, and LISERL analyses, Williams et al. (1998) found support for the self-determination model of autonomous motivation to increase medication adherence. One limitation of this study is the use of a cross-sectional design, which captures a specific point in time and may not accurately reflect participants' long-term medication adherence. A second limitation was the use of self-report measures to assess for medication adherence. While self-report measures offer quick and inexpensive methods to assess adherence, these measures are subjective and may not reflect actual pill-taking behavior. Additionally, the sample itself provides a limitation to this study in that those interviewed may not represent the general population. Finally, there may be valuable information regarding long-term medication

adherence missing from individuals who decide not to participate in this study (Williams et al., 1998).

Despite these limitations, a notable strength of this study is Williams et al. (1998) supported their initial hypothesis regarding the importance of autonomous motivation and perceived autonomy support from medical providers. Additionally, this study found a correlation between perceived barriers to adherence and autonomous motivation. Specifically, individuals who felt more autonomous had fewer perceived barriers to adherence (Williams et al., 1998). Furthermore, the authors stress the incorporation of interventions that focus on strengthening patients' perceived autonomy in their health-related decisions. The purposed study seeks to evaluate motivational interviewing effectiveness in supporting participants' autonomy and medication adherence.

Lynam et al. (2009) further explain the role of autonomous motivation and its prediction of antiretroviral therapy (ART) adherence. Using a randomized, controlled trial of ART medication adherence, 189 participants were recruited from five clinics that provided HIV medical care. To measure adherence, participants received a Mediation Events Monitoring System (MEMS®) bottle, an electronic system that measures bottle cap openings. An assumption of this system is that each bottle opening of a least five seconds signifies that medication is being taken. After one week, data from MEMS® prescription bottles were downloaded and used to measure ART adherence (Lynam et al., 2009).

Path analysis suggests autonomous motivation is associated with ART adherence for PLWHA (Lynam et al., 2009). Once again, this supports the importance healthcare providers fostering autonomy in their work with PLWHA. However, autonomy is not the only basic need to address when considering medication adherence for PLWHA. Lynam et al. (2009) highlighted

that autonomous motivation is mediated by self-efficacy, a concept related to competence. The next study introduces the concept of competence to the discussion regarding HIV medication adherence.

Autonomy, Competence, and Antiretroviral Medication Adherence. Chapter one introduced the effectiveness of ART for managing HIV and reducing the transmission of the virus to uninfected partners. Effective ART requires a near-perfect adherence rate and some individuals are unable to adhere adequately to their medication regimens. Furthermore, individuals on ART can experience a host of biopsychosocial barriers that contribute to poor medication adherence. Kennedy, Goggin, and Nollen (2004) built on the work of Williams et al. (1998) and explored the interplay between the SDT principles of autonomy support, autonomous motivation, and competence to ART adherence.

Participants for this study lived in a large Midwestern city and were recruited from four clinics providing HIV medical services. Eligible participants were 18-years-old or older, on ART for at least four months, and independently responsible for taking their medications. A total of 201 participants formed the study sample (85% male, 1% transgender, 55% Caucasian, average age of 40). Participants were given five questionnaires regarding background information, perceived autonomy support (*Health Care Climate Questionnaire*), perceived autonomous motivation (*Treatment Self-Regulation Questionnaire*), perceived competence (single item from the *Perceived Competence Scale*), psychological distress (*Profile of Mood States*), and current symptoms (*Signs and Symptoms Checklist for Persons with HIV Disease*). Additionally, self-reported adherence over the past 3 days was assessed via a structured interview. Finally, for a small subsample of participants (n = 40), pharmacy refill logs were used to support the validity of self-reported adherence (Kennedy et al., 2004).

Statistical analysis revealed that autonomy support predicted autonomous motivation for medication adherence (Kennedy et al., 2004). Additionally, perceived competence was the strongest direct predictor of adherence and collectively, these three principles resulted in greater ART adherence. Interestingly, autonomous motivation was not directly related to adherence (Kennedy et al., 2004). This bolsters the argument that an identified or integrated form of extrinsic motivation, rather than intrinsic, may be driving behavioral changes in individuals. Furthermore, this study reports statistical support of a reoccurring theme for PLWHA regarding psychological distress being a barrier to medication adherence.

One limitation of this study is that all measures were self-report, a form of data collection subject to ability to recall, bias, and social desirability. Additionally, this study relied on a convenience sample of voluntary HIV-positive individuals. While the sample does represent individuals from four different clinics, the sample may not adequately reflect the larger population of PLWHA, including those out of care (Kennedy et al., 2004). Despite these limitations, this study provides the groundwork for SDT's principles of autonomy and competence as related to ART medication adherence. The next study explores the interplay between what SDT identifies as humans' basic psychological needs – autonomy, competence, and relatedness.

Basic Psychological Needs and Antiretroviral Medication Adherence. Sikkema and Kelly (1996) suggest that PLWHA who take an active and collaborative role in planning their treatment with healthcare provider often feel empowered and have more positive attitudes toward HIV medication adherence. Quinlivan et al. (2013) suggest individuals who are aware of their HIV-positive status and engage in care use ART more effectively. Quinlivan et al. (2013) apply SDT's basic needs (i.e., autonomy, competence, and relatedness) to the adoption of healthcare

41

behaviors by women of color following an HIV diagnosis. Specifically, this study focuses on the three basic needs during HIV testing, entry into and engagement in HIV care.

Study participants were recruited from an academic Infectious Diseases clinic in North Carolina. Participants were mostly African-American women (88%), older than 40-years-old (70%), and had an HIV diagnosis for more than six years (87%). Using qualitative interviews, 30 HIV-positive women of color were asked to describe their experiences with the HIV care system at various stages (i.e., the HIV Continuum of Care: testing, entry into care, engagement in care). Transcripts from focus groups and individual interviews were reviewed and expressions reflecting the SDT basic needs were identified. For example, phrases such as "I feel like giving up" or "I chose to…" reflect autonomy related concepts.

Quinlivan et al. (2013) found that the particular needs were important at different points in the HIV Continuum of Care. For instance, during the testing phase, participants demonstrated a need for competence in obtaining knowledge about their diagnosis. Furthermore, relatedness became more important as participants become increasingly engaged with the healthcare system. Finally, autonomy may be absent immediately following diagnosis but develops in tandem with relatedness and competence as participants remained in care for HIV treatment (Quinlivan et al., 2013).

Quinlivan and colleagues (2013) findings highlight that HIV-positive women of color readily expressed the need for autonomy, competence, and relatedness as they participated in the HIV system of care. The authors suggest this informs the appropriateness of interventions with respects to progress along the HIV Continuum of Care. Additionally, Quinlivan et al. (2013) report that motivation was present in 92% of the responses when discussing facilitators and

barrier to care. This implies motivation itself plays an important role in individuals' decision to engage and remain in care.

While the results of this study contribute to the literature regarding self-determination theory, motivation, and HIV medication adherence, the study itself is not without limitations. Specifically, this study only included women who were currently engaged in care and may not capture the experiences of those who are out of care. Additionally, this study used self-report data and required participants to reflect on their experiences making this study limited by time (i.e., how well they recall experiences; Quinlivan et al., 2013).

Limitations of Self-Determination Theory

While SDT provides a prescriptive model on how to motivate others, there are some limitations of this theory (Vansteenkiste & Sheldon, 2006). First, SDT was originally developed as a way to study intrinsic motivation and early studies focused on educational settings (Patrick & Williams, 2012). More specifically, early applications of SDT focused on the relationship between motivation and educational outcomes (e.g., do students with more intrinsic motivation perform better than those who are more extrinsically motivated; Deci, Vallerand, Pelletier, & Ryan, 1991; Vallerand et al., 1992). While SDT has been applied to numerous educational and work settings, there is limited applications to therapeutic counseling settings (Vansteenkiste & Sheldon, 2006).

Secondly, this theory assumes that individuals take an active role in their lives and possess the ability to decide whether they participate in different activities (Vansteenkiste et al., 2012). However, this assumption may not apply to everyone as some individuals face constant environmental pressures that influence their decision-making abilities (Vansteenkiste & Sheldon, 2006). Specifically, PLWHA may face a number of individual- and systemic-level barriers that

inhibit their ability to fulfill the needs of autonomy, competence, and relatedness. PLWHA may be unable to attend to these psychological needs and instead focus on addressing basic human needs such as housing. As a result, these individuals may be more likely to experience amotivation and have less than optimal overall functioning (Vansteenkiste & Sheldon, 2006).

Systems of HIV care are encouraged to establish interventions that address multiple barriers to help increase engagement in care (Wawrzyniak et al., 2015). One effective intervention is strengths-based case management (Hoffman et al., 2017). Through this model, individuals can engage in skill-building to address multiple individual-level barriers to care while being assisted by a case manager to address larger, system-level barriers (Wawrzyniak et al., 2015). Motivational interviewing is a treatment modality that can be incorporated into case management to facilitate the assessment phase of treatment and establish a supportive and collaborative patient-provider relationship to foster engagement in HIV care (Tahan & Sminkey, 2012). The next section introduces the clinical approach of motivational interviewing and provides examples of its utility to facilitate behavioral changes related to health including ARV medication adherence.

Motivational Interviewing

Motivational interviewing is a client-centered, clinical approach that helps individuals explore and address ambivalence about behavioral changes (Miller & Rollnick, 1991). The concept of motivational interviewing evolved from experience in the treatment of problem drinkers and was first described by Miller (1983). Though atheoretical in nature, motivational interviewing is grounded in the works of Carl Roger's person-centered psychotherapy (Rogers, 1959). Motivational interviewing combines the warmth and empathy of person-center psychotherapy with specific techniques such as reflective listening and development of

44

discrepancy (Treasure, 2004). Additionally, this person-centered approach allows interviewers to arrange "conversations so that people talk themselves into change based on their own values and interest" (Miller & Rollnick, 2013, p. 4). Specifically, motivational interviewing utilizes a collaborative approach that elicits clients' motivations for behavioral changes, which are then reinforced by "strengthening a person's own motivation and commitment to change" (Miller & Rollnick, 2013, p. 12).

Motivational interviewing assumes that people have a desire to change. However, most people experience ambivalence about making desired changes (Miller & Rollnick, 2013). Ambivalence is a feeling in which individuals feel two, often competing, ways about a matter (Douaihy, Kelly, & Gold, 2015). Ambivalence is a normal part of the process regarding behavioral change (Douaihy et al., 2015). Additionally, unresolved ambivalence can serve as a barrier to change (Wagner & Ingersoll, 2012). As a result of ambivalence, individuals may engage in two kinds of talk, change talk and sustain talk. Change talk refers to individuals' statements in favor of change(s); comparatively, sustain talk describes individuals' statements in favor of maintaining current behaviors (Miller & Rollnick, 2013).

In response to client change talk or sustain talk, counselors can respond from three core communication styles that lie on a continuum (i.e., directing to guiding to following; Miller & Rollnick, 2013). A *directing* communication style places the counselor in the expert role by offering advice or instruction (Douaihy et al., 2015; Miller & Rollnick, 2013). Counselors may unintentionally assume this communication style when responding to clients from the righting reflex. The righting reflex occurs when counselors desire to "fix" areas of concerns for clients (Miller & Rollnick, 2013). Motivational interviewing stresses the need for counselors to refrain

from responding to the righting reflex as this relies on the use of the unhelpful directing

communication style (Douaihy et al., 2015).

Representing the opposite end of the continuum is the following communication style

which mimics the person-centered approach to counseling (Douaihy et al., 2015). Specifically,

counselors using this style seek to understand clients and refrain from imposing their own

thoughts or opinions on clients (Miller & Rollnick, 2013). Finally, the guiding communication

style is a combination of the two poles, having a balance between being a supportive listener and

serving as the expert when needed (Douaihy et al., 2015). While all three styles are useful in

different situations, motivational interviewing relies primarily on a guiding communication style

as a means facilitate conversations to explore and address ambivalence (Miller & Rollnick,

2013).

Spirit of Motivational Interviewing

Motivational interviewing identifies four interrelated elements that comprise the spirit of

motivational interviewing: (a) partnership, (b) acceptance, (c) compassion, and (e) evocation

(PACE) (Miller & Rollnick, 2013).

Partnership. In motivational interviewing, the therapeutic relationship is a partnership

that involves a respectful collaboration between counselors and clients (Wagner & Ingersoll,

2012). Clients are placed in the expert role concerning their lives which establishes a positive

working relationship between clients and counselors (Miller & Rollnick, 2013). Furthermore,

counselors' primary goal is to understand clients' experiences and perspectives and facilitate

conversations supportive of behavioral changes (Wagner & Ingersoll, 2012).

Acceptance. Acceptance is an attitude assumed by counselors that respects what clients

bring to encounters (Douaihy et al., 2015). Acceptance does not imply that counselors agree with

the choices clients' make. Instead, acceptance incorporates four aspects – absolute worth, accurate empathy, autonomy support, and affirmation – that in turn facilitates change (Wagner & Ingersoll, 2012). Absolute worth suggests counselors accept the value of clients as human beings (Douaihy et al., 2015). In essence, this aspect is similar to the counseling concept of unconditional positive regard towards clients. The contrasting view of absolute worth is one of judgment, which prevents individuals' ability to engage in behavioral changes (Miller & Rollnick, 2013).

Accurate empathy describes how counselors assume a genuine interest in learning and understanding the ways in which clients perceive their world (Douaihy et al., 2015). Doing so allows counselors to validate clients' unique experiences/perspectives and ultimately increase clients' awareness of themselves (Wagner & Ingersoll, 2012). Miller and Rollnick (2013) point out that the "opposite of empathy is the imposition of one's own perspective, perhaps with the assumption that the other's views are irrelevant or misguided" (p. 18). The practice of motivational interviewing underscores the need to avoid dismissing clients' experiences regardless of counselors' perceived significance (Douaihy et al., 2015).

Acceptance also involves respecting clients' right to autonomy. Autonomy affords clients with the ability to self-determine (i.e., make choices; Douaihy et al., 2015). Additionally, autonomy acknowledges that counselors cannot make clients change their behaviors (Wagner & Ingersoll, 2012). Finally, affirmations recognize clients' strengths and efforts rather than focusing on perceived weaknesses (Miller & Rollnick, 2013). Affirmations highlight clients' resiliency and build momentum upon what is working well for them (Douaihy et al., 2015; Wagner & Ingersoll, 2012).

Compassion. Miller and Rollnick (2013) describe compassion as "a deliberate commitment to pursue the welfare and best interests of the other" (p. 20). Compassion is not merely an emotional response; rather counselors who exhibit compassion intentionally place the clients' perspectives and welfare ahead of their own (Wagner & Ingersoll, 2012). Motivational interviewing discourages its use as a treatment modality for the pursuit of self-interest and suggests that doing so in a breach of professional ethics (Miller & Rollnick, 2013; Wagner & Ingersoll, 2012).

Evocation. Lastly, the spirit of motivational interviewing is evocative, in that counselors assist clients in exploring how their own experiences and perspectives influence motivation to change. Counselors refrain from imposing their opinions and instead use a collaborative approach to build upon clients' intrinsic motivation to elicit behavioral changes (Douaihy et al., 2015). The motivational interviewing approach is different from traditional medical interviews that rely heavily on closed questions and directive communication. The next section explores the utility of motivational interviewing to elicit behavioral changes in a health-related context.

Motivational Interviewing and Behavioral Changes Related to Health

Originally developed to help individuals with alcohol use concerns, motivational interviewing has evolved into a treatment modality with a wide range of applications including behavioral changes for issues such as depression (Brody, 2009), dieting (Britt & Blampied, 2010) and medication adherence (Salvo & Cannon-Breland, 2015). Motivational interviewing is also a useful tool in working with individuals with chronic conditions such as hypertension and diabetes (Zeligman & Robinson, 2014). Furthermore, there is a body of research that explores the influence motivational interviewing has on medication adherence in PLWHA (DiIorio et al., 2003; DiIorio et al., 2008; Krummenacher, Cavassini, Bugnon, & Schneider, 2011; Murphy,

Greenwell, & Hoffman, 2002a; Safren et al., 2001). These studies are discussed in detail later in this chapter.

Central to motivational interviewing is the *OARS* counseling approach (Miller & Moyers, 2006). The OARS acronym suggests counselors use: open-ended questions, affirmations, reflections or reflective listening, and summaries; doing so, facilitates a healthy therapeutic alliance between clients and counselors (Miller & Moyers, 2006). When working with PLWHA, counselors ask *open-ended questions* to explore thoughts and barriers to medication adherence (Zeligman & Robinson, 2014). For example, a counselor may use the following question to discover adherence concerns, "What types of things prevent you from taking your medications as prescribed?" *Affirmations* can be used to support clients' willingness to share personal information. Sharing medication adherence information can be difficult if the lack of adherence is perceived as a failure (Zeligman & Robinson, 2014). Counselors can affirm clients' strength to discuss adherence concerns by making statements such as "I appreciate that you are willing to share with me some concerns you are having. I recognize this may have taken a lot of courage to share this information with me."

Using reflections affords clients the opportunity to explore any ambivalence regarding the topic of adherence and to discuss their motivations for change (Zeligman & Robinson, 2014). Counselors may choose to reflect the emotional aspects of adherence to create a greater impact. For instance, a counselor may state, "You feel angry about the inconvenience of having to take medications daily while your family does not share this experience." Finally, concluding sessions with *summaries* allows the counselor to point out any discrepancies between clients' goals and current behaviors (Zeligman & Robinson, 2014). Additionally, summaries can be used to highlight any changes counselors have noticed over the course of their work with clients. Using

the OARS counseling approach and incorporating the spirit and principles of motivational interviewing (discussed later in the chapter) into therapeutic work with clients can help increase medication adherence for PLWHA.

Miller and Rollnick (2009) report motivational interviewing is not: (a) based on the transtheoretical model of change; (b) a decisional balance process; (c) a form of cognitive-behavioral therapy or client-centered therapy; (d) a technique for tricking individuals into doing something; (e) easy to learn; (f) practice as usual; or (g) a comprehensive approach to treatment (Miller & Rollnick, 2009). Of most importance to the present study is motivational interviewing's lack of a theoretical framework, which makes motivational interviewing difficult to empirically study (Miller & Rollnick, 2009). However, research proposes a possible union between motivational interviewing and the empirically based theory known as self-determination theory, a concept explored later in the chapter (Markland, Ryan, Tobin, & Rollnick, 2005; Miller & Rollnick, 2012; Vansteenkiste & Sheldon, 2006).

Motivational Interviewing and Antiretroviral Medication Adherence

Coinciding with the advent of ARVs was the development of strategies that helped PLWHA with medication adherence. Again, the effectiveness of ART relies on a high (95%) adherence rate as well as maintaining this level adherence over long periods of time. Individuals may have trouble maintaining adherence to HIV medications. Thus, researchers have explored ways to improve medication adherence to ART.

Safren et al. (2001) compared two minimal-treatment interventions to increase adherence for individuals that had difficulty with HIV medication adherence. Specifically, Safren et al. (2001) evaluated two intervention approaches: (a) Life-Steps, a single-session intervention combining cognitive-behavioral, motivational interviewing, and problem-solving strategies; and

(b) self-monitoring involving the use of a pill diary and an adherence questionnaire. Additionally, this study examined specific psychosocial predictors of adherence. Specific psychosocial variables included depression, satisfaction with social support (SSQ), punishment beliefs about HIV infection, adherence self-efficacy, frequency of alcohol use, and frequency of other substances (Safren et al., 2001).

Participants were recruited from a community health center that served individuals who identify as LGBTQ and HIV-positive. A total of 140 participants were selected for inclusion in this study, and 84 (76 men) of the participants were included in the psychosocial predictors component of the study. The remaining 56 (49 men) individuals from the original sample participated in the intervention portion of the study only. Participants completed self-report measures at the initial visit and were asked to return twice at 2 and 12 weeks intervals (Safren et al., 2001).

Safren et al. (2001) found statistically significant relationships between baseline adherence and the psychosocial factors of depression, SSQ, punishment beliefs, and adherence self-efficacy. These findings lend support to the inclusion of psychosocial variables in the present study as they highlight potential barriers to medication adherence. Additionally, participants in the Life-Steps intervention demonstrated faster improvement in adherence when compared to those in the self-monitoring group (Safren et al., 2001). These results suggest that client-centered interventions such as motivational interviewing can be useful for individuals who are experiencing medication adherence concerns.

While the Safren et al. (2001) work yields valuable information to the present study some limitations are noted. One limitation is that HIV medication adherence was based on self-report. The use of self-report lends itself to potential bias and recall error. Additionally, this study

51

utilizes a small sample size, which limited the statistical power to detect differences between groups (Safren et al., 2001).

In a similar study, Murphy, Lu, Martin, Hoffman, and Marelich (2002b) performed a pilot trial which incorporated a multicomponent intervention to improve medication adherence for HIV-positive individuals. Participants included 33 HIV-positive individuals with medication adherence concerns. Further, participants were assigned to a standard care condition or the intervention condition. The intervention included: (a) behavioral strategies, (b) patient information, (c) social support and (d) an alternating series of five group and individual sessions over the span of seven weeks. Assessments were completed at the initial visit, at post-intervention (seven to eight weeks after baseline), and 3 months post-intervention. Participants were assessed on the following domains: (a) self-report adherence, (b) coping strategies for adherence, (c) social support, (d) mental health, (e) depression, (f) health-related anxiety, (g) adherence efficacy, and (h) outcome expectancies (Murphy et al., 2002b).

Like the Safren et al. (2001) findings, participants in the intervention group who received behavioral strategies, showed an increase in medication adherence when compared to participants in the standard care group (Murphy et al., 2002b). Additionally, those in the intervention group had higher self-efficacy in patient-physician communication, social support, and acceptance of the need for taking medication despite barriers. These findings support the need for a client-centered approach that offers relatedness (patient-physician communication and social support) and autonomy (acceptance of the need for taking medications). As in Safren et al. (2001) study, a limitation of Murphy et al. (2002b) study was the small sample size. Despite both studies limitations, the works of Safren et al. (2001) and Murphy et al. (2002b) begin the discussion of incorporating a client-centered, behavioral intervention that includes psychosocial

barriers to improve ART medication adherence for PLWHA. The current study explored the influence of biopsychosocial barriers on medication adherence. Specifically, this study examined the influence of medical (i.e., physical health), mental health, substance use, housing, transportation, and employment concerns.

In another pilot study, DiIorio et al. (2003) used motivational interviewing to "foster and support medication adherence among individuals who are starting or changing HAART" (p. 55). A total of 20 participants were recruited for this study; each participant was randomly assigned to either the intervention or control group. Study measures included the use of the UCSF Adherence Questionnaire, the Antiretroviral General Adherence Scale, and two items asking how often in the past two weeks and 30 days had individuals missed taking their medications. Participants completed pre-and post-assessments concerning medication adherence. Additionally, participants in the intervention group completed three motivational interviewing sessions with a nurse counselor prior to their follow-up assessment (DiIorio et al., 2003).

Overall, participants in the intervention group had higher self-reported adherence when compared to those in the control group. However, the sample size for this study was small, limiting the use and interpretation of the results. Additionally, unlike Safren et al. (2001) and Murphy et al. (2002b) studies, participants in this study reported adherence to their medication regimens at baseline (DiIorio et al., 2003). Having a sample of individuals who have trouble with medication adherence would have strengthens the applications of this study. Another limitation was the reliance on self-report measures of medication adherence (DiIorio et al., 2003). Again, self-report measures are subject to concerns related to bias and recall. These limitations, however, were addressed in DiIorio et al. (2008) follow-up randomized controlled study. The

current study utilized a larger sample size as well as incorporated objective measures of medication adherence (i.e., CD4 cell count and HIV viral load).

In the follow-up study by DiIorio et al. (2008), a total of 247 participants were recruited from an HIV/AIDS clinic to complete a baseline assessment. Participants were either prescribed ART for the first time or changing their medications. All participants were given a MEMS® cap to track use of one ART medication in their regimen. To establish a baseline for participants, adherence data was collected for three-weeks using the MEMS® cap. Following the three-week baseline measurement, participants were randomly assigned to either the intervention (n = 125) or control group.

The intervention consisted of five, individual motivational interviewing sessions provided by registered nurses over a three-month period. Participants in the control condition received treatment as usual and were provided adherence education by three nurse educators. All participants were asked to return monthly to download MEMS® cap data. In addition to MEMS®, medical records of participants were reviewed for viral load and CD4 counts. Finally, at 3-, 6-, and 12-months, participants completed a questionnaire as well as face-to-face interviews regarding medication adherence (DiIorio et al., 2008).

For this study, 11 nurses were trained in the use of motivational interviewing in a 24-hour introductory model. Additionally, nurses completed periodic booster sessions to help reinforce motivational interviewing techniques and their use. Nurses recorded motivational interviewing tapes, which were then coded for fidelity using a structured coding form. If needed, nurses were provided with individualized training to improve their motivational interviewing skills. Overall, though, the nurses in this study were adherent to motivational interviewing skills during the motivational interviewing sessions (DiIorio et al., 2008).

The results of this study suggest that participants in the motivational interviewing intervention group were taking their ART medications as prescribed (i.e., in dose and on time; DiIorio et al., 2008). These findings support the use of motivational interviewing in increasing medication adherence to ART medications. One important finding of this study is that all study participants demonstrated some general improvement in their viral load and CD4 counts over the course of the study (DiIorio et al., 2008). This may imply some overall improvement in viral load and CD4 counts for individuals engaged in HIV treatment. A limitation of this study is that the researchers did not limit participants to those who reported experiencing difficulties in ART adherence (DiIorio et al., 2008). DiIorio et al. (2008) suggests that doing so may have limited their ability to "fully test the usefulness of motivational interviewing in promoting behavioral change" (p. 282). The current study included staff trained in the use of motivational interviewing with follow-up training and supervision. The final study in this review explores the use of motivational interviewing with individuals who have difficulty with HIV medication adherence.

Krummenacher and colleagues' (2011) study expands the body of literature on using motivational interviewing to improve ART medication adherence with PLWHA. In this retrospective study, Krummenacher et al. (2011) analyzed an interdisciplinary HIV-adherence program that combined motivational interviewing strategies as well as electronic drug monitoring (EDM). For this study, EDM was captured using MEMS® caps. Additionally, this study captured participants' socio-demographics, clinical characteristics (e.g., ART naïve versus experience, type of ART medication), viral load, and CD4 cell count (Krummenacher et al., 2011).

One hundred and four patients (59% women, 42% black) were included in the study, of which 80 individuals were ART-experienced (prior use of ART medications; Krummenacher et

al., 2011). Interventions were provided by pharmacists who used organized, semi-structured motivational interviews incorporating four axes: (a) cognitive intervention (e.g., beliefs, knowledge); (b) motivational intervention (e.g., readiness to engage in treatment); (c) behavioral intervention (e.g., daily medication regimen); and (d) affective and social intervention (e.g., feelings towards medication adherence, support persons).

Unlike the other studies mentioned in this review, this study lacked randomization of participants in intervention versus control groups (Krummenacher et al., 2011). This limits the interpretation of how the HIV-adherence program influences medication adherence. Despite this limitation, this study offers some important insights. One unique component of this study is the following of HIV medication adherence over a 13-month period and tracking adherence rates over time (Krummenacher et al., 2011). Doing so allowed the researchers to track variability in medication adherence over time. One important finding was that over time there was a decline in execution (i.e., daily intake). This implies that individuals may need long-term support to maintain medication adherence. Given this information, the current study followed medication adherence over time. Additionally, the current study focused on individuals who were having difficulty with medication adherence. Finally, this study uses data collected during routine clinical activities providing results from a real-world perspective, like the current study.

Motivational Interviewing and Self-Determination Theory Conceptual Overlaps

While self-determination theory offers an empirically supported information concerning human motivation, this theory lacks a systematic way of implementing the tenants of SDT into practice. Comparatively, motivational interviewing is a specific treatment modality that is atheoretical in nature (Miller & Rollnick, 2009). Research suggests that when integrated, SDT can offer the theoretical framework that motivational interviewing lacks while concurrently,

56

motivational interviewing can provide a practical application of SDT principles concerning

motivating therapeutic change (Markland et al., 2005; Vansteenkiste & Sheldon, 2006;

Vansteenkiste, et al., 2012).

Vansteenkiste and Sheldon (2006) suggest motivational interviewing and SDT were

developed as a dissatisfaction with existing frameworks that "de-emphasize the phenomenology

of the individual (p. 65). Specifically, motivational interviewing was a response to counseling

approaches that encouraged the use of confrontation such as DiCicco, Unterberger and Mack's

(1978) alcoholism intervention strategy. Similarly, early SDT studies provided an alternative

view to B.F. Skinner's (1974) operant conditioning and use of positive reinforcement (e.g.,

rewards; Vansteenkiste and Sheldon 2006). Self-determination theory, instead, highlights the

potential undermining effects of external motivations in the form of rewards (Deci & Ryan,

1985a).

Both motivational interviewing and SDT believe that people are capable of making

changes in their lives (Vansteenkiste & Sheldon, 2006). Further, both theories conceptualize

humans as active and growth-oriented organisms that have a natural propensity to improve and

having internal resources to do so (Vansteenkiste & Sheldon, 2006). Additionally, when using

motivational interviewing counselors encourage and support autonomy, guide the changes

process, and accept individuals' worldview (Miller & Rollnick, 2013; Deci & Ryan, 1985b).

The Role of Satisfying Basic Psychological Needs

Self-determination theory identified three basic psychological needs – autonomy,

competence, and relatedness – individuals need for overall wellbeing. As previously discussed,

the *spirit of motivational interviewing* has four elements (i.e., partnership, acceptance,

compassion, and evocation). Additionally, motivational interviewing has four key principles: (a)

express empathy, (b) support self-efficacy, (c) roll with resistance, and (d) develop discrepancy (Miller & Rollnick, 2002). As Vansteenkiste and Sheldon (2006) suggest, motivational interviewing's four key components can be conceptualized in terms of SDT's three basic psychological needs.

The first principle, *expressing empathy*, encourages counselors to engage in perspective taking and see "the world through the eyes of the client" (Crowe & Parmenter, 2012, p. 127). Using empathy, counselors avoid assuming the expert role and acknowledge the importance of clients' points of view and feelings. Counselors are able to express empathy by using reflective listening as a means to demonstrate an understanding of PLWHAs' worldview (Treasure, 2004). This concept aligns with SDT's need for relatedness, in that a collaborative relationship is established in healthy therapeutic relationships (Vansteenkiste & Sheldon, 2006).

Another principle of motivational interviewing is to support self-efficacy. The intent of supporting self-efficacy is to enhance individuals' self-confidence that change is possible (Treasure, 2004). Counselors support self-efficacy by demonstrating the belief in PLWHAs' ability to make behavioral changes (Crowe & Parmenter, 2012). Supporting self-efficacy likely satisfies individuals' need for competence and increases the likelihood of behavioral changes occurring (Vansteenkiste & Sheldon, 2006).

Rolling with resistance is another key principle of motivational interviewing. Moyers and Rollnick (2002) conceptualize resistance as "the product of an interaction between the therapist and the client" (p. 187). Counselors are encouraged to "sidestep" confrontation that may arise from reacting to resistance and instead respond with empathy (Treasure, 2004). Resistance becomes problematic when counselors impose their perspectives on individuals, limiting their perceived freedom of choice (Crowe & Parmenter, 2012). As such, this principle aligns with

PLWHAs' need for autonomy to make and act upon choices including medication adherence (Vansteenkiste & Sheldon, 2006).

Finally, developing discrepancy helps individuals identify incongruities between their current behaviors and their desired goals or values (Moyers & Rollnick, 2002). Exploring discrepancy with PLWHA facilitates the process of change (Crow & Parmenter, 2012). From an SDT-perspective, this principle also supports clients' need for autonomy to make changes that better align their behavior and values (Vansteenkiste & Sheldon, 2006). In short, the four key principles of motivational interviewing have conceptual overlap with SDT's three basic psychological needs in that these principles support the satisfaction of needs.

The Concept of Motivation as Applied to Medication Adherence in People Living with HIV/AIDS

As mentioned earlier, intrinsic motivation is an inherent desire to participate in activities individuals find interesting (Deci & Ryan, 1985a). Deci and Ryan (1980) define intrinsic motivation, as "…behaviors that are motivated by the underlying need for competence and self-determination" (p. 42). A functional definition of intrinsic motivation encompasses individual freedom of choice and internal locus of control. More specifically, individuals demonstrate a willingness to engage in activities in which they find value (Kessler, 2013).

Motivational interviewing purports increasing intrinsic motivation to change (Miller & Rollnick, 2002). However, given the definition of intrinsic motivation as well as the concept of autonomy, which suggests counselors cannot make clients change their behaviors, an increase in individuals' intrinsic motivation may not be what is occurring (Wagner & Ingersoll, 2012). From an SDT-perspective, motivational interviewing likely facilitates an identified or integrated form of extrinsic motivation (Vansteenkiste & Sheldon, 2006). The following discussion describes

different forms of regulation within extrinsic motivation identified in the organismic integration mini-theory and provides examples of the current population of study. Figure 2.1 is included to provide a visual representation of these concepts.

Figure 2.1

The Self-Determination Continuum

```
┌──────────────┐              ┌──────────────┐                                              ┌──────────────┐
│  Amotivation │              │   Extrinsic  │                                              │   Intrinsic  │
│              │              │  Motivation  │                                              │  Motivation  │
└──────┬───────┘              └──────┬───────┘                                              └──────┬───────┘
       │               ┌─────────────┼──────────────┬──────────────┐                              │
┌──────┴───────┐  ┌─────┴──────┐ ┌────┴──────┐ ┌─────┴─────┐ ┌──────┴─────┐                 ┌──────┴───────┐
│     Non-     │  │  External  │ │ Introjected│ │ Identified│ │ Integrated │                 │  Intrinsic   │
│  Regulation  │  │ Regulation │ │ Regulation │ │ Regulation│ │ Regulation │                 │  Regulation  │
└──────────────┘  └────────────┘ └───────────┘ └───────────┘ └────────────┘                 └──────────────┘
```
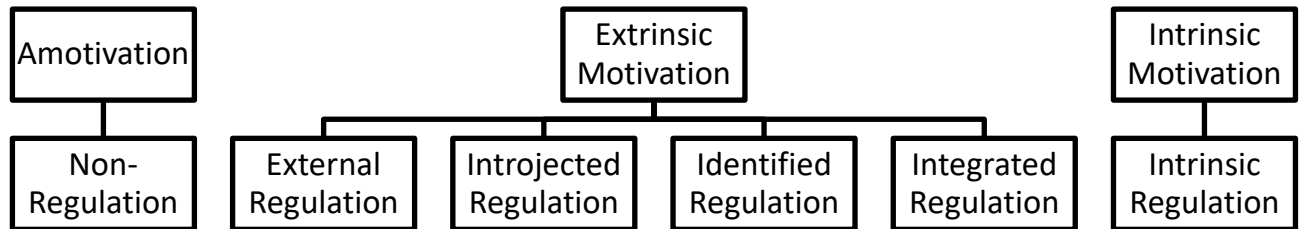
Amotivation. The state in which individuals lack cause to act is *amotivation* (Deci & Ryan, 2000). In essence, amotivation is an absence of motivation and represents one end of the motivational continuum. Ryan (1995) states "People are amotivated when they do not see action as either (a) reliably connected with outcomes (as in helplessness) or (b) viable given perceived incompetence or lack of environmental supports" (p. 407). For example, PLWHA may be focused on barriers such as housing or employment and not see the connection between taking ART. Additionally, individuals may express no desire to take medication if they cannot readily identify the health benefits. Other reasons include disinterest in the activity, inability to complete tasks, and irrelevance of the activity to individuals (Deci & Ryan, 2000).

External regulation. External regulation occurs when motivation is contingent upon individuals receiving positive reinforcement (e.g., rewards) or avoiding punishments (e.g., negative consequences) from an outside source (Kessler, 2013). When rewarded, individuals with external regulation perform well. However, if the reward is removed or punishment occurs performance declines. For example, individuals may meet treatment goals (e.g., taking

60

medications) when incentives such bus passes are provided. However, PLWHA who lack reliable transportation may lose interest in achieving treatment goals when incentives are no longer available.

Introjected regulation. According to the organismic integration theory, introjected regulation manifests from internal processes (Deci & Ryan, 2000). Specifically, the preservation of self-worth and the avoidance of negative feelings drive individuals' behaviors (Nicholls, 1984). Therefore, barriers to medication adherence such as mental health concerns (e.g., anxiety or depression) and substance use issues may exacerbate negative feelings (i.e., guilt, shame, embarrassment, or anxiety) leading to decreased feelings of self-worth and resistance to medication adherence.

Identification regulation. Unlike, introjected regulation, identification regulation originates due to the need for competence (Beasley & Garn, 2013). That is, behaviors are not due to reward-seeking behavior, avoidance of punishment, sublimation of negative emotions, or enjoyment and pleasure (Beasley & Garn, 2013). Instead, motivation occurs when individuals are able to connect with the personal importance of a behavior and perceive behaviors as their own (Deci & Ryan, 2000). Consequently, individuals may experience competing priorities between their choices and that of their healthcare providers. For example, patients may prioritize environmental stability (e.g., stable housing and employment) over medication adherence.

Integrated regulation. Individuals display integrated regulation once they assimilate the values derived from identification regulation into their self-concepts (Deci & Ryan, 2000; Kessler, 2013). Integrated regulation is also the most autonomous version of extrinsic motivation (Kessler, 2013). Additionally, integrated regulation share characteristics of intrinsic motivation but remains an extrinsic form of motivation because motivations to engage in behaviors do not

originate from the self as in intrinsic motivation (McLachlan, Spray, & Hagger, 2011).

Integration happens when behaviors are congruent with individuals' values and personal needs

(Deci & Ryan, 2000). For example, individuals take their medications regularly because doing so

aligns with their personal belief system regarding health and wellbeing. Most importantly, these

individuals do not feel any negative feelings associated with their decisions. However, if an

individual's physical health is compromised and attending to medical concerns (e.g., taking

medications, keeping appointments) becomes too difficult, this too can pose a barrier to

medication adherence.

It is important to note that neither the continuum nor the subtypes of extrinsic motivation

represent a linear track through which individuals' progress. For example, a person can express

amotivation and remain there even when rewards or punishments are introduced (Deci & Ryan,

2000). Additionally, individuals may begin an activity out of obligation (e.g., leading HIV peer

support groups) and continue to do so because they enjoy the activity (e.g., helping others). In

sum, motivational interviewing does not influence individuals' intrinsic motivation; rather

motivational interviewing works to promote the internalization of the most autonomous form of

extrinsic motivation (i.e., integrated).

<div align="center">**Conclusions from Reviews**</div>

The collective research reviewed in chapters one and two suggests that antiretroviral

therapy (ART) is effective in reducing morbidity and mortality from HIV and AIDS-related

concerns as well as decreasing the transmission of HIV to uninfected individuals. However, ART

regimens typically require a near perfect adherence to be effective. Individuals with HIV/AIDS

may experience a unique set of biopsychosocial barriers that limit or inhibit their ability to take

ART as prescribed. A host of research supports the use of motivational interviewing in a variety

of clinical settings to increase HIV medication adherence. Additionally, the literature identifies many of the biopsychosocial barriers that impede medication adherence. However, few studies have explored the use of motivational interviewing to increase medication adherence while simultaneously addressing barriers to adherence. The present study explores the intersection of a multidisciplinary team utilizing motivational interviewing strategies and techniques while concurrently addressing the biopsychosocial barriers that may inhibit medication adherence.

Chapter Summary

This chapter provided a discussion of common biopsychosocial barriers to antiretroviral medication adherence and identified those barriers used in the current study. Additionally, Chapter Two offered a review of motivational interviewing and self-determination theory as well as introduced the relevant empirical research related to motivational interviewing and medication adherence for PLWHA. Chapter Three introduces research design, population, sample, data analysis as well as the materials and instrumentation for this study.

CHAPTER THREE: METHODS

Introduction

This chapter provides an overview of the methods for the study investigating the influence of biopsychosocial factors and motivational interviewing on antiretroviral medication adherence for people living with human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) in a multidisciplinary medical healthcare setting. In this chapter the research questions, population, sample, research design, as well as the materials and instrumentation are provided. Additionally, this chapter presents multiple logistic regression, the statistical analysis used to examine the data. Finally, the ethical considerations of the study are discussed.

Research Questions

This study examined the influence of biopsychosocial factors and motivational interviewing on antiretroviral medication adherence in people living with HIV/AIDS (PLWHA). This study addressed the following research questions:

(a) How do biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predict antiretroviral medication adherence in people living with human immunodeficiency virus and acquired immune deficiency syndrome as measured by patients' CD4 count cut score at week 21?

(b) How do biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predict antiretroviral medication adherence in people living with human immunodeficiency virus and acquired immune deficiency syndrome as measured by patients' HIV viral load cut score at week 21?

(c) Is there a statistically significant relationship between patients' CD4 cut score at week 21 and patients' HIV viral load cut score at week 21 in predicting antiretroviral medication adherence?

Population and Sample

The population of this study included individuals who were clinically diagnosed with HIV/AIDS. The sample included residents of eastern North Carolina (ENC) who were clinically diagnosed with HIV/AIDS and receiving HIV/AIDS treatment from East Carolina University – Brody School of Medicine HIV Clinic. Patients were eligible for study inclusion if they were: a resident of Eastern North Carolina, clinically diagnosed with HIV/AIDS, eligible for outpatient treatment services at the ECU BSOMHIV Clinic, currently receiving HIV/AIDS treatment from the ECU BSOMHIV Clinic, 18 years old or older, currently living, not currently incarcerated, and psychiatrically stable. Patients were ineligible for study inclusion if they were: not or no longer a resident of Eastern North Carolina, not clinically diagnosed with HIV/AIDS, not eligible for outpatient treatment services at the ECU BSOMHIV Clinic, currently receiving treatment from the ECU BSOMHIV Clinic for a single health condition other than HIV/AIDS (e.g., Hepatitis C only), younger than 18 years old, currently deceased, currently incarcerated, and psychiatrically unstable. Patients chosen to be in the sample were assumed to be representative of the population, strengthening external validity.

A stratified sample of 210 patients was drawn from the archival data for this study. Stratified sampling is a form of probability sampling that consists of subgroups, or strata (Ary, Jacobs, Sorensen, & Razavieh, 2010). The strata for this study included the years before, during, and after the implementation of motivational interviewing at the BSOMHIV Clinic. The three strata of this study were: Strata 1: August 2013 – July 2014, Strata 2: August 2014 – July 2015,

and Strata 3: August 2015 – July 2016. A random sample of equal size ($n = 70$) was chosen from each stratum. The rationale for using a stratified, random sampling was to study the differences that might exist between subgroups of the study's population (Ary et al., 2010). Using stratified sampling ensures representation of different strata when compared to simple random sampling because it reduces the likelihood that certain strata may by chance be under- or overrepresented in the sample.

Research Design

This study was a secondary analysis of clinical data routinely collected through a health behavior questionnaire at a multidisciplinary HIV treatment clinic in eastern North Carolina. Specifically, this study was interested in comparing patients' antiretroviral (ARV) medication adherence before and after an organizational adoption of motivational interviewing to help identify biopsychosocial barriers to and increase motivation for ARV treatment adherence.

Procedures – Motivational Interviewing Training

The study utilized data collected from a Ryan White – Part D Supplemental grant-funded project instituted by the East Carolina University (ECU) – Brody School of Medicine HIV Program. This project, known as Project CARE, was developed to train clinic staff involved in treatment adherence in the use of motivational interviewing techniques (MIT). The intended goal of this project was to teach clinic staff how to integrate MIT into daily interactions with patients, to identify biopsychosocial barriers, and to increase patient motivation for ARV medication adherence.

From August 2014 to June 2015, motivational interviewing trainings were provided on-site at the Brody School of Medicine HIV (BSOMHIV) Clinic. Trainings were facilitated by two Motivational Interviewing Network of Trainers (MINT) certified trainers from ECU's

Department of Addictions and Rehabilitation Studies. A variety of team members from the BSOMHIV Clinic (e.g., medical case coordinators, behavioral health specialist, medication adherence clinical pharmacist, nurses) were trained over a one-year span. For this study, only the data from the medical case coordinators was examined because they were responsible for administering the *Annual Risk Assessment Screening Tool* (described below). Medical Case-Coordinator had a bachelor degree in social work or psychology.

The training module for the CARE program included a traditional two-day, introduction to motivational interviewing components to develop proficiency in the use of motivational interviewing skills. Team members also participated in Learning Community groups, which were designed to provide continuous learning, skill building, and coaching facilitated by the two certified trainers (Appendix A). For the Learning Communities, the two certified trainers identified two team members to co-lead each session. The two designated team members demonstrated proficiency in the use of motivational interviewing following the two-day introductory course.

Additionally, team members submitted monthly recordings of interactions with clients that were later coded for motivational interviewing skill proficiency. Motivational interviewing skill proficiency of clinic staff was assessed using the Motivational Interviewing Treatment Integrity (MITI) 3.0 coding system. Tapes were coded by a doctoral student who was trained by the two Motivational Interviewing Network of Trainers (MINT) certified trainers from ECU's Department of Addictions and Rehabilitation Studies. Individualized motivational interviewing proficiency feedback was provided to team members and areas of deficiency were remediated one-on-one with team members and team leads.

Procedures – Data and Data Collection

Archival data is defined as "data that have already been collected by an agency or organization and are in their records or archives" (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017, "Data Collection Methods: Pros and Cons," para. 1). Benefits of using archival data includes low cost, large sample sizes, and good to moderate validity (Anglin, Reid, Short, Zachary, & Rutherford, 2017; SAMHSA, 2017). Another advantage of using archival data is the availability of longitudinal data (Shultz, Hoffman, & Rieter-Palmon, 2005). This study utilized archival data of patients' CD4 count and HIV viral load to examine the influence of biopsychosocial factors and motivational interviewing on antiretroviral medication adherence in PLWHA.

The data used was collected between July 2013 and July 2016 at the BSOMHIV Clinic. Data for analysis was obtained from patients' electronic health records through retrospective chart reviews and entered into SPSS software package version 24 with identifying information removed. Figure 3.1 outlines the *Treatment as Usual Procedure*, which describes the typical progression of patients starting at the intake process, to medication initiation, and finally to medication adherence. For the purpose of this study, specific variables of interest for analysis included: patients' biopsychosocial factors captured by the *Annual Risk Assessment Screening Tool* at intake (Week 1) and patients' CD4 count and HIV viral load captured at 21 weeks post-intake (Week 21).

Figure 3.1

Treatment as Usual Procedure

Week 1 (Initial Intake)	Time Elapsed Since Intake: 3 Weeks	**Week 4** (Follow-up #1)	Time Elapsed Since Intake: 1 month	**Week 8** (Follow-up #2)	Time Elapsed Since Intake: 3 months	**Week 21** (Follow-up #3)
• Completion of *Annual Risk Assessment Screening Tool* with assigned Medical Case Coordinator • CD4 lab work • Viral load lab work		• First appointment with medical provider • Antiretroviral medication initiation		• Second appointment with medical provider		• Third appointment with medical provider • CD4 lab work • Viral load lab work

Materials and Instrumentation

Treatment as usual included the administration of the *Annual Risk and Assessment Screening Tool* (Appendix B) and the collection of patients' current viral load and CD4 count at intake. Twenty-one weeks post intake, patients' viral load and CD4 count were reexamined to compare medication adherence over time.

Annual Risk Assessment Screening Tool

The *Annual Risk Assessment Screening Tool* is a multidimensional screener utilized by medical case coordinators (MCCs) during participants' initial intake session. This tool addresses the following domains: (a) basic demographic information (e.g., gender, race, age), (b) Ryan White/ADAP Eligibility, (c) Health Education, (d) Medical Care Coordination, and (e) Behavioral Health Services.

Ryan White/ADAP Eligibility. The *Ryan White/ADAP Eligibility* section captures information regarding the Ryan White application, current insurance type, annual income, primary care services for HIV, and current housing situation (i.e., stable, unstable, or unknown).

Health Education. The *Health Education* section begins with the highest level of education achieved. This question is followed by a brief self-report literacy assessment. Participants rated themselves on how well they believe they read and write (1 = not very well to 5 = very well). Participants are then instructed to identify seven medical terms (menopause, antibiotics, exercise, jaundice, rectal, anemia, and behavior) using the *Rapid Estimate of Adult Literacy in Medicine-Short Form* (REALM-SF). The REALM-SF is a 7-item tool that measures health literacy based on word recognition of the aforementioned medical terms (Arozullah et al., 2007).

Medical Care Coordination. The *Medical Care Coordination* section explores the domains of intimate partner violence, HIV diagnosis history, medication adherence history, and barriers to care. Specific barriers to care of interest in this study include: (a) medical (i.e., physical health), (b) mental health, (c) substance use and co-morbid concerns, (d) lack of housing, (e) lack of transportation, and (f) lack of employment/underemployment.

Behavioral Health Services. The *Behavioral Health Services* section assesses patients' mental health and substance use concerns. Specifically, this section incorporates the *Patient Health Questionnaire for Depression and Anxiety (*PHQ-4; Löwe et al., 2010), the *Drug Abuse Screening Test* (*DAST-10*; National Institute on Drug Abuse [NIDA], n.d.; Evren et al., 2013), and the *Fagerström Test of Nicotine Dependence* (Korte, Capron, Zvolensky, & Schmidt, 2013). These screeners are used by medical case managers to determine whether patients may require behavioral health services for co-morbid mental health and/or substance use concerns.

CD4 Count

The CD4 T lymphocyte (CD4) cell count is one of the two markers used to detect patients' response to antiretroviral treatment (AIDSInfo, 2018). In general, the CD4 count of

seronegative individuals in good health ranges from 500 cells/mm^3 to 1,600 cells/mm^3.

Monitoring patients' CD4 count is important because it is an indicator of overall immune

function in PLWHA (HIV.gov, 2017e). Additionally, this laboratory test is the strongest

predictor of HIV disease progression (AIDSInfo, 2018). For instance, one of the qualifications

for a diagnosis of stage 3 of HIV infection (AIDS) in PLWHA is a CD4 count of fewer than 200

cells/mm^3 (HIV.gov, 2017e). In monitoring patients' immunologic response to ART, patients

who adhere to their medication regimens have an increase in CD4 count from 50 to 150

cells/mm^3 during the first year, with the most significant changes occurring within the first 3

months of treatment (AIDSInfo, 2018). In this study, CD4 counts with a count of >500

cells/mm^3 will reflect antiretroviral medication adherence.

Viral Load

Viral load testing is an objective measure that uses a blood sample to determine the

number of HIV viral copies in a sample of blood (WHO, 2013). Viral load testing is the gold

standard used to determine the effectiveness of antiretroviral medications for PLWHA

(UNAIDS, 2016). Generally, a score of 400 copies or less of HIV viral load per milliliter of

blood sampled is desired (Holstad, DiIorio, & McCarty, 2011). At this cutoff, viral levels are

considered suppressed, which means there is an insignificant amount of viral copies of HIV in

the blood (UNAIDS, 2016). PLWHA who are considered virologically suppressed have a low

risk of transmitting the virus and typically have high medication adherence rates. Due to the

objective nature of this test, HIV viral load has high reliability and validity. However, there is no

set cut point for viral load as clinics establish different standards for suppressed viral loads

(Holstad et al, 2011). For example, the BSOMHIV Clinic's set cut point for viral load is < 20.

However, this study chose to use the World Health Organization's threshold of 1,000 copies/mL

to be inclusive of global, national, and BSOMHIV clinic's standards (WHO, 2016a). For this study, HIV viral loads <1,000 copies/mL will indicate antiretroviral medication adherence.

Statistical Analyses

For this study, data was analyzed using the statistical software package, SPSS version 24. Descriptive statistics such as skewness, standard deviation, and range for the sample, predictor variables, and outcome variables are provided. Correlation between predictors was analyzed to determine if multicollinearity had an effect on analysis results.

Two multiple logistic regression analyses were used to determine how biopsychosocial barriers and motivational interviewing predict antiretroviral medication adherence in PLWHA as measured by patients' CD4 count and HIV viral load. Multiple logistic regression is used to analyze data in which there are two or more predictor variables that determined the outcome (Moore, McCabe, Craig, 2009). For this study, individual predictor variables were categorical and included: physical health (comorbidity or no comorbidity), mental health (comorbidity or no comorbidity), substance use (comorbidity or no comorbidity), housing (stable or unstable), transportation (reliable or unreliable), and employment (employed or unemployed). These predictors were used in both multiple logistic regression analyses. Motivational interviewing (before program implementation or after program implementation) was an additional predictor variable for both multiple logistic regression analyses. Finally, to control for differences in patients' intake CD4 count and viral load cut scores, a second multiple logistic regression model will be performed adding patients' CD4 count cut scores and patients' viral load cut scores, respectively. An $\alpha = 0.05$ was used to determine statistical significance for all tests, which is reported as a customary alpha level for social science research (Witte & Witte, 1997).

In logistic regression, the outcome variable is dichotomously coded as either 1 (e.g., true, present, success) or 0 (e.g., false, absent, failure; Moore et al., 2009). Dichotomous cut-off scores for this study aligned with global, national, and BSOMHIV Clinic's standards. Specifically, dichotomous CD4 counts cut-off scores were: ≥ 500 cells/mm^3 (1 – immunocompetent) or <500 cells/mm^3 (0 – immunocompromised). Dichotomous HIV viral loads cut-off scores were: >1,000 copies/mL of blood (1 – virologically unsuppressed) or <1,000 copies/mL of blood (0 – virologically suppressed).

Because multiple logistic regression uses maximum likelihood estimation, larger sample sizes are needed in comparison to multiple regression that uses ordinary least squares. One rule of thumb suggests having a minimum of 20 cases per independent variable after controlling for missing data (Garson, 2016). Given the seven independent variables in this study (i.e., physical health, mental health, substance use, housing, transportation, employment, and motivational interviewing), a minimum of 140 patients was needed to meet the recommendations for sample size in multiple logistic regression analyses. Because the presence of small or empty cells may cause the model to become unstable and in turn affect interpretation, the sample size was increased to 210. Crosstabs were conducted to assure all cell frequencies were ≥ 1 and 80% or more of cells are > 5 (Garson, 2016).

The Hosmer-Lemeshow (H-L) goodness of fit test is the recommended test to determine the overall fit of multiple logistic regression models. The H-L goodness of fit tests divides responses into approximately ten equal groups based on predicted probabilities. This test then computes a chi-square from the number of observations and expected events (i.e., frequencies) from which a probability (p) value is computed from the chi-square distribution. This p-value

tests the fit of the logistic model (Garson, 2016). A non-significant finding (i.e., p > .05) suggests the model adequately fits the data.

A chi-square test for independence was used to determine if there was a statistically significant relationship between antiretroviral medication adherence predicted by patients' CD4 count and antiretroviral medication adherence predication by patients' HIV viral load. Chi-square tests is used to determine whether there is a significant association between two variables.

Ethical Considerations

Ethics are a key element in counseling research and should be considered throughout the research process. While an array of ethical codes exists for counselors (e.g., American Counseling Association Code of Ethics, National Board for Certified Counselors), six basic moral principles: autonomy, nonmaleficence, beneficence, justice, fidelity, and veracity, underscore the considerations for this study (Corey, Corey, & Callanan, 2011). Particularly, the rights and welfare of the individuals participating in research are of great concern. Historically there have been instances in which research studies have neglected these principles (e.g., Tuskegee syphilis studies; Gil & Bob, 1999) and have caused immeasurable harm to participants.

Certain steps were taken to ensure participants' rights and welfare. Prior to statistical analysis, this study underwent approval by the ECU's Institutional Review Board (Appendix C) to ensure the rights of human research participants were protected. Additionally, this study did not exclude individuals based on any demographic variables such as race, gender, or sexual orientation allowing for, though not guaranteeing, a diverse sample.

To ensure patient privacy and meet ethical considerations, all electronic data was encrypted and saved in a designated departmental Piratedrive on a computer protected with a password. Retrospective chart reviews were performed under the direct supervision of the

BSOMHIV Clinic's HIPAA administrator and Clinical Data Analyst. Data collected during retrospective chart reviews was coded and transformed into aggregate data. Any data collected during retrospective chart reviews was stored on a password-protected computer and saved on Internal Medicine - Infectious Diseases & International Travel Health departmental Piratedrive. This computer was in a locked office at Internal Medicine - Infectious Diseases & International Travel Health, Doctor's Park 6A Room 161. The BSOMHIV Clinic's HIPAA administrator, Clinical Data Analyst, and the principal investigator for this study were the only ones with access to this data set.

Prior to data analysis, records were stripped of all 18 personal identifiers related to protected health information. Patients' data was de-identified by representing each patient with a unique 9-digit code containing letters (capital and lowercase), numbers, and the "+" symbol. Additionally, data was analyzed at the group level rather than the individual level. Analyzed data was stored on a password-protected computer and saved on the Department of Addictions and Rehabilitation Studies departmental Piratedrive. This computer was in a locked office in the College of Allied Health Sciences, Room 4425C. All analyzed data will be stored for 6 years after the completion of the study. The research team for this study will be the only ones with access to the data.

<div align="center">

Chapter Summary

</div>

This chapter introduced the research design, population, sample, as well as the materials and instrumentation that were used in this study. Additionally, this chapter discussed the statistical analyses and described the ethical considerations of the study. Chapter Four provides descriptive statistics and a detailed summary of the results of the statistical analyses used in this study.

CHAPTER FOUR: RESULTS

Introduction

This chapter describes the results of the statistical analyses used in this study. A description of the sampling procedures including data cleaning is provided. Descriptive data describes the overall sample characteristics. Additionally, analyses for each research question is provided and discussed. Finally, a summary of the results concludes this chapter.

Sampling Procedures

A total of 627 patient records were identified for study inclusion based on patients' date of intake. Of these, 218 patients were excluded from the study for one or more of the following reasons: (a) not or no longer being a resident of eastern North Carolina, (b) not having a diagnosed with HIV/AIDS, (c) not being eligible for outpatient treatment services at the ECU BSOMHIV Clinic, (d) currently receiving treatment from the ECU BSOMHIV Clinic for a single health condition other than HIV/AIDS (e.g., Hepatitis C only), (e) being younger than 18 years old, and (f) being incarcerated, psychiatrically unstable or deceased,. Of the remaining 409 patients, a stratified sample of 70 patients was collected from each of the three strata: Strata 1 – Year 1 (August 2013 – July 2014); Strata 2 – Year 2 (August 2014 – July 2015); Strata 3 – Year 3 (August 2015 – July 2016). After performing stratified sampling the total sample size was $N = 210$.

Data Cleaning

Data cleaning was conducted to obtain the appropriate sample for analysis. After sampling 70 patients from within each stratum (i.e., Year 1, Year 2, and Year 3), the total sample size was $N = 210$. Using SPSS, frequency analysis was performed for each variable to detect missing values. Frequencies revealed unequal cell sizes, which were problematic when

comparing groups before and after the implementation of the BSOMHIV Clinic's motivational interviewing program. Specifically, the Year 1 stratum had 46 records with multiple missing values, resulting in unequal cell sizes. Missing values were excluded from the study because these values can affect study results. To address this concern, a second random sample of $n = 50$ patient records was collected from the Year 1 strata to create equal groups. Additional procedures were performed to exclude cases with redundant CD4 counts and viral load. The final, usable sample for this study was comprised of 168 patients.

<div align="center">

Descriptive Data

</div>

Sample Characteristics

This section provides a description of the sample. Demographic data of patients are summarized in Table 1. The sample consisted of adults, age 18 to 75 years, who were receiving HIV/AIDS-related treatment services at the BSOMHIV Clinic. Of the 168 patient records in the sample, the average age was 39.48 ($SD = 13.25$). For gender, 128 (76.2%) of the sample identified as male and 40 (23.8%) identified as female. The distribution of ethnicity was predominately patients who identified as African American ($n = 125$; 74.4%). The remaining 25.6 percent of the sample represented patients who identified as White (non-Hispanic; $n = 30$; 17.9%), Hispanic (n = 11; 6.5%), Asian ($n = 1$; 0.6%), or more than one ethnicity ($n = 1$; 0.6%). Finally, the sample was grouped based on two diagnosis status – newly diagnosed (positive diagnosis of HIV/AIDS within the past two months) or previously diagnosed. For this sample, 41.7 percent ($n = 70$) were identified as previously diagnosed while the remaining 58.3 percent ($n = 98$) were identified as newly diagnosed.

Table 1

Demographics of the Sample

Demographic Variable	M (SD)	*n* (%)
Age	39.48 (13.25)	
Gender		
Female		40 (23.8%)
Male		128 (76.2%)
Ethnicity		
African-American		125 (74.4%)
Asian		1 (0.6%)
Hispanic		11 (6.5%)
White (non-Hispanic)		30 (17.9 %)
More than one ethnicity		1 (0.6%)
Diagnosis Status		
Previously Diagnosed		70 (41.7%)
Newly Diagnosed		98 (58.3%)

Descriptive Statistics for Variables

Descriptive statistics for predictor and outcome variables are provided. Correlations between predictors were analyzed to determine if multicollinearity had an effect on results.

Predictor variables. Table 2 summarizes the frequency for each of the seven predictor variables. Predictor variables were categorical and included: (a) physical health (comorbidity or no comorbidity), (b) mental health (comorbidity or no comorbidity), (c) substance use (comorbidity or no comorbidity), (e) housing (stable or unstable), (f) transportation (reliable or unreliable), (g) employment (employed or unemployed), and (h) motivational interviewing (before program implementation or after program implementation). The majority of patients did not indicate physical health (89.3%), mental health (76.2%), substance use (88.7%), housing (89.3%), transportation (80.4%), or employment (83.3%) as a biopsychosocial barrier to HIV/AIDS care. In terms of motivational interviewing, 45.8 percent (*n* = 77) of the sample were

patients who completed intake prior to the implementation of the motivational interviewing program while the remaining 54.2 percent ($n = 91$) were completed intake after the motivational interviewing program was implemented.

Table 2

Descriptive Statistics of Predictor Variables

Predictor Variable	n (%)
Biopsychosocial Barriers	
Physical Health	
Comorbidity	18 (10.7%)
No comorbidity	150 (89.3%)
Mental Health	
Comorbidity	40 (23.8%)
No comorbidity	128 (76.2%)
Substance Abuse	
Comorbidity	19 (11.3%)
No comorbidity	149 (88.7%)
Housing	
Stable	150 (89.3%)
Unstable	18 (10.7%)
Transportation	
Reliable	135 (80.4%)
Unreliable	33 (19.6%)
Employment	
Employed	140 (83.3%)
Unemployed	28 (16.7%)
Program Implementation	
Motivational Interviewing	
Before implementation	77 (45.8%)
After implementation	91 (54.2%)

Checking model assumptions – multicollinearity. One of the assumptions for multiple logistic regression is there should be no high correlations (multicollinearity) among predictors.

The *phi* coefficient measures the degree of association between two binary variables (Tabachnick & Fidell, 2013). Correlation between predictors was analyzed to determine if multicollinearity had an effect on the analysis. Table 2 provides the *phi* correlation matrix with the seven predictor variables. There was a statistically significant correlation at α = .05 (2-tailed) for the following variable pairs – mental health and physical health, housing and employment. There was a statistically significant correlation at α = .01 (2-tailed) for the following variable pairs – mental health and substance use, transportation and housing. Though statistically significant, these four pairs have relatively low correlation coefficients. Further, Tabachnick and Fidell (2013) suggest that correlation coefficients less than 0.90 meet assumptions for multiple logistic regression. As such, it is assumed that there is little to no multicollinearity among predictors and model assumptions are met for this study.

Table 3

Phi Correlation Matrix of Predictor Variables

	PH	MH	SU	HO	TR	EM	MI
PH							
MH	.168[*]						
SU	.059	.242[**]					
HO	-.058	.123	-.002				
TR	.071	.075	.060	.265[**]			
EM	-.052	-.063	-.008	.155[*]	.020		
MI	-.029	.037	-.011	-.029	.094	-.069	

Notes. *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed). PH = physical health. MH = mental health. SU = substance use. HO = housing. TR = transportation. EM = employment. MI = motivational interviewing intervention.

Outcome variables. Patients' CD4 count cut scores at week 21 and HIV viral load cut scores at week 21 were the outcome variables. Table 4 summarizes the frequency for the

biological markers at intake and at week 21. Outcome variables were dichotomized for the

logistic regression analysis. Specifically, dichotomous CD4 counts cut scores were: ≥ 500

cells/mm^3 (1 – immunocompetent) or <500 cells/mm^3 (0 – immunocompromised). Between

intake and week 21, the number of immunocompromised patients decreased from $n = 115$

(68.5%) to $n = 97$ (57.7%). Additionally, the number of immunocompetent patients in the sample

increased from $n = 53$ (31.5%) to $n = 71$ (42.3%). This suggests that more patients became

immunocompetent between their intake session and at 21 weeks post-intake.

Dichotomous HIV viral loads cut scores were: $\geq 1,000$ copies/mL of blood (1 –

virologically unsuppressed) or $<1,000$ copies/mL of blood (0 – virologically suppressed). At

intake, 75.6 percent ($n = 127$) of the sample were virologically unsuppressed and expressed HIV

viral loads greater than 1,000 copies/mL of blood. Comparatively, only 8.3 percent ($n = 14$) of

the sample was virologically unsuppressed at week 21. This suggests that more patients became

virologically suppressed between their intake session and at 21 weeks post-intake.

Table 4

Descriptive Statistics of Outcome Variables as Cut Scores

Outcome Variable	n (%)
CD4 at Intake	
499 and below (immunocompromised)	115 (68.5%)
≥ 500 (immunocompetent)	53 (31.5%)
CD4 at Week 21	
499 and below (immunocompromised)	97 (57.7%)
≥ 500 (immunocompetent)	71 (42.3%)
Viral Load at Intake	
$\geq 1,000$ (virologically unsuppressed)	127 (75.6%)
999 and below (virologically suppressed)	41 (24.4%)
Viral Load at Week 21	
$\geq 1,000$ (virologically unsuppressed)	14 (8.3%)

999 and below (virologically suppressed)   154 (91.7%)

Notes. For CD4: 499 and below reflects immunocompromised patients; ≥ 500 reflects immunocompetent patients. For viral load: ≥ 1,000 reflects patients who are virologically unsuppressed; 999 and below reflects patients who are virologically suppressed.

Checking model assumptions – normality. Multiple logistic regression does not assume predictor variables are normally distributed. However, biological data is often skewed and heavy-tailed (Santos, Loschi, & Arellano-Valle, 2013). Skewness measures the degree and direction of asymmetry, which can indicate the presence of extreme scores (Ary et al., 2010). Because the outcome variables in this study are biological in nature, skew statistics were run and are discussed. Table 5 summarizes the mean, standard deviation, and skewness for patients' CD4 count and HIV viral load at intake and week 21. Both outcome variables at intake and at week 21 show a positive skew. Specifically, the skewness of the data shows a slightly positive skew for CD4 at intake (0.64) and at week 21 (0.96). The skewness statistic shows a largely positive skew (11.32) for viral load at intake and a positive skew (9.28) for viral load at week 21. Positive skew for HIV viral load indicate that patients have lower viral loads, have reached or are close to being virologically suppressed, and are demonstrating medication adherence.

Table 5

Descriptive Statistics of CD4 and Viral Load

Outcome Variable	Mean	Std. Deviation	Skewness
CD4 (Intake)	358.32	292.97	0.64
CD4 (Week 21)	471.13	344.90	0.96
Viral Load (Intake)	174763.92	800416.50	11.32
Viral Load (Week 21)	5662.51	38539.72	9.28

Examining biopsychosocial barriers and biological markers together. Table 6 provides the percent of patients falling into either the immunocompromised or

immunocompetent category for CD4 count cut score or the virologically unsuppressed or virologically suppressed category for HIV viral load score at intake. For CD4 count cut score at intake, the majority of patients ($n = 115$) had an immunocompromised CD4 status. Of these patients ($n = 115$), an average of 10 percent indicated physical health as a barrier, 23 percent indicated mental health as a barrier, 12 percent indicated substance use as a barrier, 9 percent indicated housing as a barrier, 17 percent indicated transportation as a barrier, and 16 percent indicated employment as a barrier.

Comparatively, of the immunocompetent patients ($n = 53$), an average of 13 percent indicated physical health as a barrier, 26 percent indicated mental health as a barrier, 9 percent indicated substance use as a barrier, 15 percent indicated housing as a barrier, 25 percent indicated transportation as a barrier, and 19 percent indicated employment as a barrier. Overall, there was a ±3% difference between the average percent of barriers for immunocompromised and immunocompetent patients, with the exception of housing (-6%) and transportation (-8%).

For HIV viral load, the majority of patients ($n = 127$) were virologically unsuppressed. Of these patients ($n = 127$), an average of 9 percent indicated physical health as a barrier, 25 percent indicated mental health as a barrier, 13 percent indicated substance use as a barrier, 10 percent indicated housing as a barrier, 16 percent indicated transportation as a barrier, and 17 percent indicated employment as a barrier. Comparatively, of the virologically suppressed patients ($n = 40$), 15 percent indicated physical health as a barrier, 20 percent indicated mental health as a barrier, 5 percent indicated substance use as a barrier, 12 percent indicated housing as a barrier, 24 percent indicated transportation as a barrier, and 15 percent indicated employment as barrier. When patients were virologically unsuppressed, the average percent of barriers was higher for mental health, substance use, and employment, when compared to patients who were

virologically suppressed. In contrast, when patients were virologically suppressed, the average percent of barriers was higher for physical health, housing, and transportation, when compared to patients who were virologically unsuppressed.

Table 6

Percent of Patients Classified by CD4 and Viral Load at Intake

| | CD4 at Intake N = 168 | | Viral Load at Intake N = 168 | |
	Compromised (%) n = 115	Competent (%) n = 53	Unsuppressed (%) n = 127	Suppressed (%) n = 40
Physical Health	10	13	9	15
Mental Health	23	26	25	20
Substance Abuse	12	9	13	5
Housing	9	15	10	12
Transportation	17	25	16	24
Employment	16	19	17	15

Data Analyses

This section includes the results of the analyses for each research question. Logistic regression analyses were computed separately for the outcome variables to address the first two research questions. The third question uses and discusses the results of Chi-square analysis.

Research Question A

(a) How do biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predict antiretroviral medication adherence in people living with human immunodeficiency virus and acquired immune deficiency syndrome as measured by patients' CD4 count cut score at week 21?

A multiple logistic regression analysis was conducted to determine if biopsychosocial barriers and motivational interviewing predicted medication adherence in PLWHA based on patients' CD4 count cut scores at week 21. A 2x2 contingency table (crosstab) was analyzed to assure all cell frequencies were ≥ 1 and 80% or more of cells were > 5. A test of the full model versus a model with intercept only was not statistically significant at $\alpha = .05$, $\chi^2(7, N = 168)$, $p = .513$. The Hosmer-Lemeshow (H-L) goodness of fit test yielded a non-significant chi-square ($p = .770$) suggesting the model adequately fits the data.

In addition to the H-L statistic, a classification table can describe the proportion of cases that have been classified correctly by the model. Table 7 shows how many patients' observed values of CD4 cut scores were correctly predicted by the model at 21 weeks. The results show that 86.6 percent ($n = 84$) were correctly classified for the immunocompromised group, and 26.8 percent ($n = 19$) were correctly classified for the immunocompetent group. Overall, 61.3 percent were correctly classified which is an improvement on the 57.7 percent correct classification with the constant model. This suggests that the model with predictors is a better model.

Table 7

Classification Table for CD4 Cut Scores at Week 21

Observed			Predicted		
			CD4 cut score at Week 21		Percentage Correct
			Compromised	Competent	
Step 1	CD4 cut score at Week 21	Compromised	84	13	86.6
		Competent	52	19	26.8
	Overall Percentage				61.3

Note. The cut value is .500

The logistic regression equation for this model is $\log(p/1\text{-}p) = .996 - .125_{*\text{physical health}} + .031_{*\text{mental health}} + .028_{*\text{substance use}} - .100_{*\text{housing}} - .545_{*\text{transportation}} - .586_{*\text{employment}} - .455_{*\text{MI intervention}}$.

Table 8 shows the results of the logistic regression analysis, including the test of significance for each of the coefficients in the model. Specifically, the Wald statistic has a chi-square distribution and provides the significance of each predictor in the equation, holding constant the other predictors (Burns & Burns, 2008). Coefficients with a p-value less than .05 were considered statistically significant. Using the Wald statistic, none of the seven predictor variables demonstrated statistical significance at $\alpha = .05$. This suggests that none of the predictor variables nor the use of motivational interviewing made a significant contribution to the prediction of medication adherence as measured by patients' CD4 count cut scores at week 21.

Table 8

Multiple Logistic Regression Analysis for Variables Predicting Patients' CD4 Count Cut Scores at Week 21

	B	S.E.	Wald	df	Sig.	Exp(B)
PH	-.125	.523	.057	1	.811	.883
MH	.031	.395	.006	1	.938	1.031
SU	.028	.519	.003	1	.957	1.029
HO	-.100	.545	.033	1	.855	.905
TR	-.545	.415	1.727	1	.189	.580
EM	-.586	.431	1.845	1	.174	.557
MI	-.455	.324	1.973	1	.160	.634
Constant	.966	.900	1.152	1	.283	2.627

Notes. PH = physical health. MH = mental health. SU = substance use. HO = housing. TR = transportation. EM = employment. MI = motivational interviewing intervention.

To control for differences in patients' CD4 count cut scores at intake, patients' intake CD4 count cut scores were added to the regression model. A second multiple logistic regression analysis was conducted to determine if biopsychosocial barriers and motivational interviewing predicted medication adherence in PLWHA based on patients' CD4 count cut score at week 21 while controlling for patients' CD4 count cut scores at intake. A 2x2 contingency table (crosstab)

was analyzed to assure all cell frequencies were ≥ 1 and 80% or more of cells were > 5. A test of the full model versus a model with intercept only was statistically significant at α = .05, $\chi^2(8, N = 168)$, $p < .001$. The Hosmer-Lemeshow (H-L) goodness of fit test yielded a non-significant chi-square ($p = .305$) suggesting the model adequately fits the data.

In addition to the H-L statistic, a classification table can describe the proportion of cases that have been classified correctly by the model. Table 9 shows how many patients' observed values of CD4 cut scores were correctly predicted by the model at 21 weeks while controlling for patients' CD4 cut scores at intake. The results show that 93.8 percent ($n = 91$) were correctly classified for the immunocompromised group, and 66.2 percent ($n = 47$) were correctly classified for the immunocompetent group. Overall, 82.1 percent were correctly classified which is an improvement on the 57.7 percent correct classification with the constant model. This suggests that the model with predictors including patients' CD4 cut scores at intake, is a better model.

Table 9

Classification Table for CD4 Cut Scores at Week 21, Controlling for Patients' CD4 Count Cut Scores at Intake

Observed			Predicted		
			CD4 cut score at Week 21		Percentage
			Compromised	Competent	Correct
Step 1	CD4 cut score at	Compromised	91	6	93.8
	Week 21	Competent	24	47	66.2
	Overall Percentage				82.1

Note. The cut value is .500

The logistic regression equation for this revised model (i.e., controlling for patients' CD4 count cut scores at intake) is $\log(p/1\text{-}p) = 2.882 + .238_{*\text{physical health}} + .202_{*\text{mental health}} - .300_{*\text{substance use}} + .430_{*\text{housing}} - .633_{*\text{transportation}} - .753_{*\text{employment}} - .283_{*\text{MI intervention}} - 3.463_{*\text{CD4 cut scores at intake}}$. Table 10 shows the results of the logistic regression analysis, including the test of significance for each

of the coefficients in the model, while controlling for patients' CD4 count cut scores at intake.

This revised model suggests that patients' CD4 count cut scores at intake contributed to the

model's prediction. Using the Wald statistic, patients' CD4 count cut scores at intake ($p < .001$)

demonstrated statistical significance at α = .05. This suggests that patients' CD4 count cut scores

make a significant contribution to the prediction of medication adherence as measured by

patients' CD4 count cut scores at week 21.

Table 10

Multiple Logistic Regression Analysis for Variables Predicting Patients' CD4 Count Cut Scores at Week 21, Controlling for Patients' CD4 Count Cut Scores at Intake

	B	S.E.	Wald	df	Sig.	Exp(B)
PH	.238	.695	.117	1	.732	1.268
MH	.202	.528	.147	1	.702	1.224
SU	-.300	.657	.208	1	.648	.741
HO	.430	.745	.333	1	.564	1.537
TR	-.633	.528	1.436	1	.231	.531
EM	-.753	.549	1.881	1	.170	.471
MI	-.283	.419	.455	1	.500	.754
CD4-I	-3.463	.511	45.834	1	.000*	.031
Constant	2.882	1.197	5.798	1	.016	17.845

Notes. PH = physical health. MH = mental health. SU = substance use. HO = housing. TR = transportation. EM = employment. MI = motivational interviewing intervention. CD4-I = CD4 count cut scores at intake.

Research Question B

(b) How do biopsychosocial barriers (i.e., physical health, mental health, substance use,

housing, transportation, and employment) and motivational interviewing predict antiretroviral

medication adherence in people living with human immunodeficiency virus and acquired

immune deficiency syndrome as measured by patients' HIV viral load cut score at week 21?

A multiple logistic regression analysis was conducted to determine if biopsychosocial barriers and motivational interviewing predicted medication adherence in PLWHA based on patients' HIV viral load. A 2x2 contingency table (crosstab) was analyzed to assure all cell frequencies were ≥ 1 and 80% or more of cells were > 5. A test of the full model versus a model with intercept only was statistically significant at $\alpha = .05$, $\chi^2(7, N = 168)$, $p = .026$. The Hosmer-Lemeshow (H-L) goodness of fit test yielded a non-significant chi-square ($p = .770$) suggesting the model adequately fits the data.

In addition to the H-L statistic, a classification table can describe the proportion of cases that have been classified correctly by the model. Table 11 shows how many patients' observed values of viral load cut scores that were correctly predicted by the model at 21 weeks. In this study, 100.0 percent ($n = 154$) were correctly classified for the suppressed group, and 14.3 percent ($n = 2$) correctly classified for the unsuppressed group. Overall, 92.9 percent were correctly classified, and this is an improvement on the 91.7 percent correct classification with the constant model. This suggests that the model with predictors is a slightly better model.

Table 11

Classification Table for Viral Load Cut Scores at Week 21

Observed			Predicted		
			Viral load cut score at Week 21		Percentage Correct
			Suppressed	Unsuppressed	
Step 1	Viral load cut score at Week 21	Suppressed	154	0	100.0
		Unsuppressed	12	2	14.3
	Overall Percentage				92.9

Note. The cut value is .500

The logistic regression equation for this model is $\log(p/1\text{-}p) = .901 - .957_{*\text{physical health}} + .666_{*\text{mental health}} - 2.321_{*\text{substance use}} - .414_{*\text{housing}} - .767_{*\text{transportation}} + .101_{*\text{employment}} - .921_{*\text{MI intervention}}$.

Table 10 shows the results of the logistic regression analysis, including the test of significance for each of the coefficients in the model. Of the seven predictive variables, substance use contributed to the model's prediction. Using the Wald statistic, the substance use predictor ($p =$ .001) demonstrated statistical significance at $\alpha = .05$. This suggests that the barrier substance use makes a significant contribution to the prediction of medication adherence as measured by patients' HIV viral load.

The Exp(B) column in Table 12 shows the odds ratio for each of the predictors. The Exp(B) value associated with substance use is 0.098. Hence, when controlling for the other six predictors and when substance use is *not* a barrier, patients become 0.098 times less likely to have an unsuppressed viral load. Taking the reciprocal (1/0.098 = 10.204), the odds ratio could be interpreted as patients become 10.2 times more likely to have an unsuppressed viral load when substance use is a barrier.

Table 12

Multiple Logistic Regression Analysis for Variables Predicting Patients' Viral Load Cut Scores at Week 21

	B	S.E.	Wald	df	Sig.	Exp(B)
PH	-.957	.816	1.376	1	.241	.384
MH	.666	.767	.755	1	.385	1.947
SU	-2.321	.696	11.127	1	**.001***	.098
HO	-.414	.977	.180	1	.671	.661
TR	-.767	.675	1.292	1	.256	.464
EM	.101	.880	.013	1	.908	1.107
MI	-.921	.662	1.938	1	.164	.398
Constant	.901	1.373	.431	1	.512	2.463

A 2x2 contingency table (crosstabs) was used to generate information about the bivariate relationship of the substance use predictor and viral load cut score at week 21. Table 13 provides the results of the crosstabulation. During intake, 11.3 percent ($n = 19$) of patients indicated that substance use was a barrier to treatment, while 88.7 percent ($n = 149$) of patients did not. Of the total number of patients ($n = 19$) who indicated substance use as a barrier to treatment at intake 68.4 percent ($n = 13$) were virologically suppressed at week 21. Comparatively, of the total number of patients ($n = 19$) who indicated substance use as a barrier to treatment at intake 31.6 percent ($n = 6$) were virologically unsuppressed at week 21.

The odds ratio for viral load cut score at week 21 was 8.135 with a 95 percent confidence interval of [2.447, 27.044]. This suggests that patients who did *not* report substance use as a barrier were eight times more likely to be virologically suppressed. Differences in odds ratio results from the logistic regression (OR = 10.204) and the crosstabulation results (OR = 8.135) are because the crosstabs function only examines one correlation to develop the odds ratio (i.e., substance use barrier by patients' HIV viral load, while the logistic regression model calculates the odds ratio with the other predictors in the model.

Table 13

Viral Load Cut Scores at Week 21 by Substance Use Barrier Contingency Table

		Substance Use Barrier		
		No comorbidity (0)	Comorbidity (1)	Total
VL cut scores at Week 21	Suppressed (0)			
	Count	141	13	154
	% within SU barrier	94.6%	68.4%	91.7%
	Unsuppressed (1)			
	Count	8	6	14
	% within SU barrier	5.4%	31.6%	8.3%
Total	Count	149	19	168
	% within SU barrier	100%	100%	100%

Notes. VL = viral load. SU = substance use.

To control for differences in patients' viral load cut scores at intake, patients' intake viral load cut scores were added to the regression model. A second multiple logistic regression analysis was conducted to determine if biopsychosocial barriers and motivational interviewing predicted medication adherence in PLWHA based on patients' viral load cut score at week 21 while controlling for patients' viral load cut scores at intake. A 2x2 contingency table (crosstab) was analyzed to assure all cell frequencies were $\geq$ 1 and 80% or more of cells were > 5. A test of the full model versus a model with intercept only was statistically significant at α = .05, $\chi^2(8, N = 168)$, p = .036. The Hosmer-Lemeshow (H-L) goodness of fit test yielded a non-significant chi-square (p = .614) suggesting the model adequately fits the data.

In addition to the H-L statistic, a classification table can describe the proportion of cases that have been classified correctly by the model. Table 14 shows how many patients' observed values of viral load cut scores were correctly predicted by the model at 21 weeks while

controlling for patients' viral load cut scores at intake. The results show that 99.4 percent ($n =$ 153) were correctly classified for the virologically suppressed group, and 14.3 percent ($n = 2$) were correctly classified for the virologically unsuppressed group. Overall, 92.3 percent were correctly classified which is an improvement on the 91.7 percent correct classification with the constant model. This suggests that the model with predictors including patients' viral load cut scores at intake, is a slightly better model.

Table 14

Classification Table for Viral Load Cut Scores at Week 21, Controlling for Patients' Viral Load Cut Scores at Week 21

Observed			Predicted		
			Viral load cut score at Week 21		Percentage Correct
			Suppressed	Unsuppressed	
Step 1	Viral load cut	Suppressed	153	1	99.4
	score at Week 21	Unsuppressed	12	2	14.3
	Overall Percentage				92.3

Note. The cut value is .500

The logistic regression equation for this revised model (i.e., controlling for patients' viral load cut scores at intake) is $\log(p/1\text{-}p) = 1.059 - 1.015_{*\text{physical health}} + .666_{*\text{mental health}} - 2.229_{*\text{substance use}} - .478_{*\text{housing}} - .812_{*\text{transportation}} + .137_{*\text{employment}} - .921_{*\text{MI intervention}} - .594_{*\text{viral load cut scores at intake}}$. Table 15 shows the results of the logistic regression analysis, including the test of significance for each of the coefficients in the model, while controlling for patients' viral load cut scores at intake. In this revised model, substance use still contributed to the model's prediction. Using the Wald statistic, the substance use predictor ($p = .001$) demonstrated statistical significance at $\alpha = .05$. Additionally, patients' viral load cut scores at intake did not contribute to the model's prediction (Wald $\chi^2 = .503$, $p = .478$). This suggests that patients' viral load cut scores do *not*

make a significant contribution to the prediction of medication adherence as measured by patients' viral load cut scores at week 21.

Table 15

Multiple Logistic Regression Analysis for Variables Predicting Patients' Viral Load Cut Scores at Week 21, Controlling for Patients' Viral Load Cut Scores at Intake

	B	S.E.	Wald	df	Sig.	Exp(B)
PH	-1.015	.829	1.499	1	.221	.362
MH	.666	.764	.761	1	.383	1.947
SU	-2.229	.701	10.116	1	**.001***	.108
HO	-.478	.968	.244	1	.622	.620
TR	-.812	.675	1.448	1	.229	.444
EM	.137	.886	.024	1	.877	1.147
MI	-.921	.664	1.924	1	.165	.398
VL-I	-.594	.837	.503	1	.478	.552
Constant	1.059	1.397	.574	1	.449	2.882

Notes. *. Significant results with p-values less than .05 are shown in boldface. PH = physical health. MH = mental health. SU = substance use. HO = housing. TR = transportation. EM = employment. MI = motivational interviewing intervention. VL-I = viral load cut scores at intake.

Research Question C

(c) Is there a statistically significant relationship between patients' CD4 cut score at week 21 and patients' HIV viral load cut score at week 21 in predicting antiretroviral medication adherence?

A chi-square test was used to determine the association between patients' CD4 cut score at week 21 and patients' HIV viral load cut score at week 21 in predicting antiretroviral medication adherence. Chi-square assumes: (a) variables are ordinal or nominal in nature, (b) data represents independent observations, and (c) all expected frequencies are > 5. All assumptions for chi-square analysis were met. Chi-square analysis results were $\chi^2(1) = 1.173$, $p = 0.279$, which suggests that there was a non-significant association between patients' CD4 cut

scores at week 21 and patients' HIV viral load cut scores at week 21 in predicting antiretroviral

medication adherence. A 2x2 contingency table (crosstabs) was used to generate information

about the bivariate relationship of patients' CD4 cut scores at week 21 and patients' viral load

cut scores at week 21. Table 16 provides the results of the crosstabulation. *Phi* is a chi-square

based measure of association for nominal data (Burns & Burns, 2008). *Phi* test results support

the non-significant chi-square analysis and show a very weak, negative association ($\varphi = -.084$)

between the two variables.

Table 16

Patients' CD4 Cut Scores at Week 21 by Patients' Viral Load Cut Scores at Week 21
Contingency Table

| | | VL cut scores at Week 21 | | |
		Suppressed (0)	Unsuppressed (1)	Total
	Compromised (0)			
	Count	87	10	97
	% within CD4 cut scores	89.7%	10.3%	100%
CD4 cut	% within VL cut scores	56.5%	68.4%	91.7%
scores at	Competent (1)			
Week 21	Count	67	4	71
	% within CD4 cut scores	94.4%	5.6%	100%
	% within VL cut scores	43.5%	28.6%	42.3%
Total	Count	154	14	168
	% within CD4 cut scores	91.7%	8.3%	100%
	% within VL cut scores	100%	100%	100%

Note. SU = substance use.

Chapter Summary

This study examined the relationship between biopsychosocial barriers, motivational

interviewing, and antiretroviral medication adherence. The sample was composed primarily of

African American men with an average age of 40 years. Multiple logistic regression analysis showed that no predictor variables made a significant contribution to the prediction of medication adherence as measured by PLWHA CD4 count. Comparatively, results showed a statistical significance for the barrier substance use when examining antiretroviral medication adherence in PLWHA as measured by patients' HIV viral load. Further, a non-significant association between patients' CD4 cut score at week 21 and patients' HIV viral load cut score at week 21 in predicting antiretroviral medication adherence was found. The following chapter provides a review and interpretation of the study results as related to the purpose of the study and the literature introduced in previous chapters. The study's limitations and future implications are also discussed.

CHAPTER FIVE: DISCUSSION

Introduction

Chapter One provided an in-depth background of human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and common biopsychosocial threats to antiretroviral (ARV) medication adherence. In Chapter Two, the theoretical framework for this study was introduced and overarching concepts for self-determination theory and motivational interviewing were provided. Chapter Three presented the methods for the present study investigating the influence of biopsychosocial factors and motivational interviewing on antiretroviral medication adherence for people living with HIV/AIDS. Chapter Four described the results of statistical analyses used to address the research questions.

The final chapter will synthesize the components from the first four chapters. Specifically, Chapter Five begins with a summary of the study including a review of the patients, data collection process, and study-specific variables. Next, limitations and implications of this study are examined. Additionally, this chapter provides a review and interpretation of the results as related to the purpose of the study, the literature introduced in the previous chapters and the SDT. This chapter will conclude with a discussion of the study's limitations, implications, and suggestions for future research.

Summary of the Study

The purpose of this study was to explore the influence of biopsychosocial barriers and motivational interviewing on antiretroviral medication adherence to improve medication adherence for PLWHA. Specifically, this study analyzed how biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predicted antiretroviral medication adherence in PLWHA as measured

by patients' CD4 count cut scores at week 21 and patients' HIV viral load cut scores at week 21. This study also explored the association between antiretroviral medication adherence predicted by patients' CD4 count cut scores at week 21 and antiretroviral medication adherence predicted by patients' HIV viral load cut scores at week 21. To conceptualize statistical analyses, results were examined through the lens of self-determination theory.

Based on the date of patient intake, a total of 627 patient records were identified for study inclusion. After an initial data cleaning procedure, 409 patients were identified as eligible for study inclusion. Of these, a stratified sample of 70 patients was collected from each of the three strata – Strata 1 – Year 1 (August 2013 – July 2014); Strata 2 – Year 2 (August 2014 – July 2015); Strata 3 – Year 3 (August 2015 – July 2016). The strata represent one year before the motivational interviewing training, the year during the motivational interviewing training, and one year following the conclusion of the motivational interviewing training. After performing stratified sampling, the total sample included 210 patients. Using SPSS, frequency analysis was performed for each variable to detect missing values and unequal cell sizes. To create equal groups, an additional random sampling of 50 patients was collected from the Year 1 stratum. Additional procedures were performed to exclude cases with redundant CD4 counts and viral load.

Demographic Data

The final sample for this study was comprised of 168 patients. Descriptive statistics of demographic variables revealed a relatively homogenous sample. The sample consisted of mostly of African American ($n = 128$; 76%) males ($n = 128$; 76.2%) with an average age of 39.4 years (SD = 13.25). Further, 41.7 percent ($n = 70$) of the patients were identified as having an HIV/AIDS diagnosis prior to coming to the Brody School of Medicine HIV (BSOMHIV) Clinic,

while the remaining 58.3 percent (*n* = 98) were identified as newly diagnosed. These results are consistent with patient demographics at the BSOMHIV Clinic (see Appendix A). Additionally, the demographic results reflect the previous literature regarding individuals of color, particularly African Americans, have higher rates of HIV infection in the United States (CDC, 2018a; Wawrzyniak et al., 2015). Given these statistics, providers of HIV/AIDS-related care in Eastern North Carolina should incorporate culturally sensitive approaches that is appropriate for individuals of color.

Descriptive Data

> **Predictor variables.** For this study, predictor variables were categorical and included: physical health (comorbidity or no comorbidity), mental health (comorbidity or no comorbidity), substance use (comorbidity or no comorbidity), housing (stable or unstable), transportation (reliable or unreliable), employment (employed or unemployed) and motivational interviewing (before program implementation or after program implementation). Interestingly, the majority of patients did not indicate physical health (89.3%), mental health (76.2%), substance use (88.7%), housing (89.3%), transportation (80.4%), or employment (83.3%) as a biopsychosocial barrier to HIV/AIDS care. These numbers appear uncharacteristically low, particularly for mental health and substance use. For instance, DeLorenze, Tsai, Horberg, & Quesenberry (2014) found that 40 percent of HIV-infected individuals engaged in illicit drug use, and more than 20 percent are diagnosed with a substance use disorder. However, research also suggests that barriers to care can be highly variable. For example, Pellowski (2013) found that transportation was a significant barrier to care for PLWHA in 9 of 11 studies. However, for this study's sample, system level barriers were not problematic. This may be due to the case management policies in place at the BSOMHIV Clinic. Specifically, patients engaging in care first interact with a linkage retention

coordinator who performs a quick barrier assessment prior to patients' intake day to ensure patients are able to maintain their scheduled intake appointment. The pre-intake screenings began in late 2012 and gradually expanded to include six new linkage retention coordinators over the last six years. With this in mind, patients entering the BSOMHIV Clinic at intake may have addressed larger, system-level barriers (e.g., transportation) through case management services received during pre-screening.

Outcome variables. The outcome variables were patients CD4 count cut scores at week 21 and HIV viral load cut scores at week 21. The dichotomized CD4 counts cut-off scores were: ≥ 500 cells/mm^3 (1 – immunocompetent) or <500 cells/mm^3 (0 – immunocompromised). The number of immunocompromised patients in the sample decreased from 115 patients (68.5%) to 97 patients (57.7%) between intake and week 21 post-intake. Additionally, the number of immunocompetent patients in the sample increased from 53 (31.5%) to 71 (42.3%). Furthermore, across the three years (strata) the average CD4 count for patients at intake was 358 cells/mm^3. Comparatively, the average CD4 count for patients at week 21 was 471 cells/mm^3. These findings are in keeping with past research which suggests that patients who are adherent to ARV medications can expect an increase in CD4 count (approximately 50 to 100 cells/mm^3) within the first three months of treatment (AIDSInfo, 2018).

The dichotomized HIV viral loads cut-off scores were: $\geq 1,000$ copies/mL of blood (1 – virologically unsuppressed) or $<1,000$ copies/mL of blood (0 – virologically suppressed). At intake, 75.6 percent ($n = 127$) of the sample were virologically unsuppressed and expressed viral loads greater than 1,000 copies/mL of blood. Comparatively, only 8.3% ($n = 14$) of the sample was virologically unsuppressed at week 21, which suggested that the majority of patients were adherent to ARV medications. These findings are consistent with past research, which shows that

patients who adhere to ARV medication regiments and have no resistant mutations can expect to

achieve viral suppression 8 to 24 weeks after ARV medication initiation (AIDSInfo, 2018).

<div align="center">**Interpretation of Statistical Analyses**</div>

This section provides interpretation of multiple logistic regression and chi-square

analyses presented in Chapter Four. Results of each research question are explored and compared

to the previous literature reviewed in Chapter Two and the SDT.

Multiple Logistic Regression Analyses

Research Question A. How do biopsychosocial barriers (i.e., physical health, mental

health, substance use, housing, transportation, and employment) and motivational interviewing

predict antiretroviral medication adherence in people living with human immunodeficiency virus

and acquired immune deficiency syndrome as measured by patients' CD4 count cut score at

week 21?

Past research suggests that the relationship between CD4 and adherence to ARV

medications is multifactorial (Ironson et al., 2005). In particular, biopsychosocial barriers such as

mental health concerns can influence patients' ability to adhere to ARV medications. Therefore,

the current study explored the predictive values of biopsychosocial barriers on medication

adherence as measured by patients' CD4 counts. However, the results indicated that all seven

predictor variables were non-significant. Further, motivational interviewing was not statistically

significant in predicting patients' CD4 counts. One possible reason for this finding is that patient

CD4 counts may be better predictors of HIV/AIDS progression and be less effective in

predicting an immediate response to ARV medications (Ironson et al., 2005). This suggests that

changes in CD4 counts may require a longer period of time before statistically significant

differences are observed.

Interestingly, the literature reveals mixed results regarding an effect of baseline CD4 count on subsequent adherence to ARV adherence. Some studies report an association between higher baseline CD4 count and *lower* adherence (Diabaté, Alary, & Koffi, 2007; Pasternak, Bruin, Bakker, Berkhout, & Prins, 2015). Comparatively, other studies have found that high CD4 at baseline was *not* associated with lower adherence (Paterson et al., 2000; Adakun et al., 2013). However, comparing results of previous studies is challenging due to differences in assessing ARV adherence and varying cutoffs for optimal versus suboptimal medication adherence.

Furthermore, antiretroviral medication guidelines are changing. Specifically, CD4 counts are particularly useful *before* initiation of ARV medications as the measurement provides information about patients' overall immune functioning (AIDSInfo, 2018). Along the same thread, this study found that adding patients' CD4 cut scores at intake significantly contributed to the multiple logistic regression model. This suggests that patients' CD4 counts before ARV medication initiation are an important determinant of medication adherence at week 21. Currently, most patients diagnosed with HIV start antiretroviral treatment regardless of their viral load or CD4 count, so the rationale for frequent CD4 monitoring is weaker than in the past (AIDSInfo, 2018). This underscores the importance of incorporate the use of both biological markers (i.e., CD4 and viral load) in routine clinical practice and HIV/AIDS outcomes related research.

Another possible reason for this finding is that other biopsychosocial barriers may be better at predicting ARV medication adherence. Based on the literature review in Chapter One and Chapter Two, the following six factors – medical (i.e., physical health), mental health, substance use, housing, transportation, and employment concerns – were identified as variables, which may be predictive of medication non-adherence in PLWHA. However, there may be other

individual, interpersonal, structural, and societal barriers to care for PLWHA. For example, Langebeek and colleagues' (2014) meta-analysis found that level of self-efficacy was a predictor of medication adherence in PLWHA (medium to large effect size). As a principle of motivational interviewing, self-efficacy helps enhance individuals' self-confidence in their ability to create change in their lives. Furthermore, supporting individuals' self-efficacy satisfies their need for competence, one of the basic needs for wellbeing identified in self-determination theory (Vansteenkiste & Sheldon, 2006). Future studies should explore possible predictor variables that satisfy the basic psychological needs of self-determination theory (i.e., autonomy, self-efficacy and social relatedness).

Additionally, in the current study, all barriers were evaluated equally as categorical variables. However, some barriers may have had more influence than others. For example, Grau et al. (2017) suggest individual-level barriers, such as motivation and co-morbidity, require individuals to take action to overcome. Some individuals may not have the resources (internal and/or external), needed to address these concerns. When considering self-determination theory, the current study's theoretical framework, case managers working with PLWHA who lack resources for change, should focus on increasing individuals' basic psychological needs. Specifically, empowering patients with the knowledge (competence) necessary to be actively involved in the decisions about their care (autonomy) may prove beneficial. Furthermore, participating in HIV specific support groups would provide social relatedness.

Research Question B. How do biopsychosocial barriers (i.e., physical health, mental health, substance use, housing, transportation, and employment) and motivational interviewing predict antiretroviral medication adherence in people living with human immunodeficiency virus

and acquired immune deficiency syndrome as measured by patients' HIV viral load cut score at week 21?

Results from multiple logistic regression analysis indicated that six predictor variables (i.e., physical health, mental health, housing, transportation, and employment) and motivational interviewing were non-significant. However, substance use as a barrier to care did demonstrate statistical significance (Wald $\chi^2 = 11.127$, $p = 0.001$, odds ratio $= 0.098$, 95% CI 0.025 – 0.384). This result aligns with meta-analysis research by Langebeek et al. (2014) that identified current substance use as associated with poor ARV medication adherence. As discussed previously, patients with substance use concerns were virologically unsuppressed, reported a statistically significant lower rate of medication adherence, and had an overall lower quality of life when compared to patients who are virologically suppressed (Wawrzyniak et al., 2015).

One possible explanation for the significance of the substance use barrier in this sample is the difference in how the barriers were captured. Specifically, the *Annual Risk Assessment Screening Tool* (Appendix B) uses psychometrically sound screeners for substance use and mental health while the other barriers (i.e., physical health, housing, transportation, employment) are self-report. Utilizing self-report measures can introduce recall error as well as social desirability bias (DiIorio et al., 2003). For instance, one study found that patients with higher social desirability scores were more likely to decrease reporting of sexual risk behaviors (e.g., more than one sexual partner) or increase reporting of protective behaviors. That being said, social desirability bias may increase underreporting of biopsychosocial concerns. This potential bias underscores the importance of fostering a collaborative patient-provider relationship, as described in motivational interviewing. Specifically, utilizing the elements that comprise the

spirit of MI (i.e., partnership, acceptance, compassion, evocation) can create an environment in which patients may feel more comfortable sharing their biopsychosocial concerns.

Unlike the other six predictor variables, substance use consistently appears in the literature as a potential barrier to care for PLWHA. This may be due to substance use being a major health concern, like HIV/AIDS, that affects individuals across all sociodemographics. Research suggests that PLWHA with co-occurring substance use concerns may have particular difficulty with utilizing positive coping skills, addressing comorbid conditions (e.g., mental health, hepatitis C), or obtaining the resources necessary to meet basic needs such as housing or transportation (Grau et al., 2017). Additionally, substance use can influence individuals' self-care beliefs and behaviors, in addition to ARV medication adherence (Remien et al., 2003). This underscores the importance of utilizing a multidisciplinary approach that includes substance use treatment for PLWHA. Furthermore, the application of SDT into a multidisciplinary approach may be of particular importance to PLWHA with substance use concerns. For instance, patients at the BSOMHIV clinic have access to programs designed to educate about the interplay of HIV and substance use (competence) while fostering relatedness through HIV specific support groups.

Recall that the odds ratio was different for the multiple logistic regression (OR = 10.204) and the crosstabulation of the substance use predictor by patients' viral load cut scores at week 21 (OR = 8.135). The crosstabs function only examines one correlation to develop the odds ratio (i.e., substance use barrier by patients' HIV viral load) while the logistic regression model calculates the odds ratio with the other predictors in the model. Although the other predictor variables were non-significant, it appears that one or more of these barriers is contributing to the influence of the substance use barrier. For instance, the substance use and mental health barrier

demonstrated a statistically significant relationship in this study. The mental health barrier may be influencing the statistical significance of the substance use barrier. Additionally, these results are reminiscent of Wawrzyniak et al. (2015) research, which suggests that co-occurring barriers are additively associated with increased HIV viral loads. Research also shows that being HIV+, along with having other physical or mental health concerns increases the likelihood that individuals will self-medicating with substances (Grau et al., 2017). The current findings reiterate the sentiments of past research by underscoring the need for strengths-based case management for PLWHA to address biopsychosocial barriers to care, particularly substance use concerns.

Multiple logistic regression analyses findings. Of the two multiple logistic regression models used for this study, the model using viral load cut scores at week 21 was the preferred model. Specifically, the model using patients' viral load was able to identify substance use as a statistically significant barrier to treatment, which had implications for ARV medication adherence.

Motivational interviewing. From August 2014 to June 2015, clinical staff at the BSOMHIV Clinic were trained in the use of motivational interviewing. During this time frame, clinic staff received a two-day introduction training course followed by monthly booster sessions to reinforce learned motivational interviewing techniques. The goal of this intervention was to teach clinic staff how to integrate motivational interviewing into daily interactions with patients to identify biopsychosocial barriers and increase patient motivation for ARV medication adherence. Multiple logistic regression results revealed that motivational interviewing was not statistically significant for either model. One possible explanation for this is the BSOMHIV Clinic utilized a strengths-based case management model prior to the motivational interviewing

conversion. As previously discussed, strengths-based case management identifies and leverages patients' strength to address individual-level barriers to care, and utilizes case managers to collaboratively overcome larger, system-level barriers (Wawrzyniak et al., 2015). Patient collaboration and strength identification are in keeping with the spirit of motivational interviewing (i.e., partnership, acceptance, compassion, and evocation). Research suggests that the spirit of motivational interviewing may be more important than the technical skills (Schoo, Lawn, Rudnik, & Litt, 2015). Thus, the similarities of the strengths-based case management model and the spirit of motivational interviewing may explain the non-significance of motivational interviewing as a predictor of ARV medication adherence. Furthermore, self-determination theory suggests that supporting patients' basic psychological needs for autonomy, encouraging competence through the evocation of patients' beliefs about health care, and establishing relatedness through respectful collaboration between patients and healthcare professionals would support patients' adherence to ARV medications. Thus, case managers following the strength-based case management model or utilizing motivational interviewing support patients' basic psychological needs, which in turn may increase medication adherence.

Another possible explanation for motivational interviewing's lack of statistical significance may be that the case managers failed to use motivational interviewing consistently. In the study, motivational interviewing was treated as a categorical variable. Specifically, medication adherence was evaluated before program implementation of motivational interviewing and after program implementation of motivational interviewing. However, case managers' motivational interviewing treatment fidelity was not evaluated. Treatment fidelity refers to the degree to which those trained in motivational interviewing adhered to the counseling behaviors, principles, and spirit of motivational interviewing (Allicock et al., 2017). Motivational

Interviewing skills can be assessed using the *Motivational Interviewing Treatment Integrity*

(*MITI*) instrument. The *MITI* uses a coding system that measures how well clinicians/case

managers are using motivational interviewing (Moyers, Manuel, & Ernst, 2014). The *MITI*

focuses on global ratings (e.g., the spirit of motivational interviewing) and behavioral counts

(e.g., open questions) and provides recommended proficiency and competency thresholds for

each skill (Allicock et al., 2017). Future studies should use the *MITI* to determine the quality of

the motivational interviewing intervention.

Chi-Square Analysis

Is there a statistically significant relationship between patients' CD4 cut score at week 21

and patients' HIV viral load cut score at week 21 in predicting antiretroviral medication

adherence?

This question was interested in analyzing whether there was a relationship between CD4

and viral load. Chi-square analysis revealed a non-significant difference between patients' CD4

cut scores at week 21 and patients' HIV viral load cut scores at week 21 in predicting

antiretroviral medication adherence (χ^2 [1] = 1.173, p = 0.279). This suggests that CD4 and viral

load are not measuring ARV medication adherence in the same way. One possible explanation

for this finding may be due to the nature of CD4 and viral load. As previously discussed, CD4

and viral load capture different components of antiretroviral medication adherence. Specifically,

viral load measures the viral particles found in each milliliter of blood, while CD4 measures

patients' immunologic response to antiretroviral treatment (AIDSInfo, 2018). Additionally, there

may be some concerns when measuring patients' CD4 counts. For instance, research suggests

that CD4 monitoring can have poor sensitivity and specificity when detecting treatment failure,

especially when CD4 cell counts are high (i.e., healthy level of cells; WHO, 2016a).

Furthermore, CD4 cell counts are highly variable and can change based on the time of day the blood was drawn or the body's exposure to other infections (HIV.gov, 2017e).

Despite these challenges, research consistently identifies CD4 count and HIV viral load as the most commonly used marker of HIV/AIDS to determine disease progression and effectiveness of antiretroviral treatments (AIDSInfo, 2018). Additionally, this study found a negative association between patients' CD4 count and their viral load ($\varphi = -.084$) which demonstrated that patients' CD4 counts increased, their viral load decreased. This finding is consistent with the past research regarding the relationship between these two biological markers (Yu & Wu, 2017). Furthermore, changes in patients' CD4 and viral responses are important in determining mortality due to a lack of ARV medication adherence. Specifically, research suggests that a significant predictor of later mortality is the failure to achieve recommended thresholds for either CD4 count or viral within three to nine months of ARV medication initiation (Moore et al., 2005).This underscores the importance of using both biological markers (i.e., CD4 and viral load) in routine clinical practice and HIV/AIDS outcomes related research.

However, CD4 and viral load testing alone does not ensure linkage to care and sustained medication adherence. Furthermore, this data is not only important to HIV service providers in determining appropriate treatment services but for patients who use these markers to understand how HIV affects their bodies. As previously discussed, individuals' belief that change is possible is enhanced through the support of self-efficacy (Treasure, 2004). In turn, supporting individuals' self-efficacy likely satisfies their need for competence, an essential component of SDT that promotes overall wellbeing. For instance, Pasternak and colleagues (2015) suggest that CD4 counts may impact patients' perception of ARV medication effectiveness. For some individuals, increased CD4 counts may *encourage* medication adherence because individuals

believe the medications are working. Comparatively, increased CD4 counts may *decrease* medication adherence because individuals see themselves as healthy and no longer needing the medications. Patients need to know the results of their CD4 and viral load tests (competence) as these results can have implications for how they choose to engage in their HIV treatment (autonomy).

Study Limitations

This section discusses the limitations of the current study including the research design and statistical analysis.

Archival data. A limitation of the study is the use of archival data. More specifically, the data was not collected to address the research questions identified in this study. Data was gathered during the routine clinical intake process and then transformed to fit the research questions. Thus, limiting the variables of study (Cheng & Phillips, 2014). Another limitation of archival data analysis is that the lead researcher and those involved in data collection were not the same individuals (Cheng & Phillips, 2014). More specifically, patients' responses to the *Annual Risk Assessment Screening Tool* were collected by medical case coordinators. Staff changes, reorganization of staff roles, and changes in clinic procedures which may have resulted in missing data, were not in the lead researcher's control. Despite these limitations, using archival data for this study was expeditious and cost-efficient.

Cross-sectional design. Another limitation of this study is the use of a cross-sectional design, which captures a specific point in time and may not accurately reflect participant long-term barriers or medication adherence. More specifically, because the current study examined patients' barriers only at intake, the effect of the barriers on patients' antiretroviral medication adherence over time is unknown. Grau and colleagues (2017) suggest that substance use often

increases after an HIV diagnosis as a coping mechanism. Additionally, substance use concerns for PLWHA can create other sources of instability (e.g., housing insecurity, financial), which may have confounded the influence of the barriers. Future research should explore the relationship between barriers and medication adherence at intake as well as over time. For those with substance use concerns, it may be important to determine if and how other predictive variables may be influencing (moderating) the strength of the relationship. Future research may benefit from utilizing a longitudinal perspective and examining biopsychosocial barriers and ARV medication adherence at multiple intervals of time. Moreover, qualitative research may provide a richer narrative for understanding patients' perspectives on how various barriers affect their ability to engage and maintain antiretroviral medication adherence.

Study sample. Because this study describes a cross-section of the current patients at the BSOMHIV Clinic during a specific range of time, there is no information about individuals who were not actively in care. Out of the initial 627 patient records identified based on patients' intake date, only 409 were considered for study inclusion. This study did not capture information for patients who had fallen out of care between intake and week 21. Furthermore, Colasanti et al. (2017) found that patients who were not retained in care had more unmet needs when compared to those who were continuously retained in care. Excluding individuals who are not enrolled in care or had fallen out of care introduces bias, as comparisons between current patients and individuals who are not currently in care were not made. For example, patients' who are in care may be more motived (or self-determined) to engage in the treatment process when compared to those who are currently out of care. Future studies may expand this study's reach and explore the barriers to antiretroviral medication adherence for out-of-care patients diagnosed with HIV/AIDS.

Hanna, Selik, Tang, and Gange (2012) suggested that there are state-specific contextual barriers to care for PLWHA. The sample for this study comes from a 30-county catchment area of eastern North Carolina. This geographic area is considered predominately rural with 12 to 33 percent of the residents living at or below the poverty level. Similar to the study by Wawrzyniak et al. (2015), this study was conducted at a clinic where patients typically represent a lower socioeconomic status. Because of patients' socioeconomic status, the sample may inherently have more barriers, including those that were not considered in this study's design (e.g., financial concerns). This, in turn, limits the interpretation of the study's results to patients from eastern North Carolina who fit a specific sociodemographic profile. To increase generalizability, future research should increase the sample size to include patients that cross-cut an array of sociodemographics.

Study variables. This study chose to examine six factors (physical health, mental health, substance use, housing, transportation, and employment concerns) as well as motivational interviewing as predictors of ARV medication adherence. While substance use was found as a predictor of ARV medication adherence as measured by patients' HIV viral load, this study acknowledges that there may be other individual and system-level barriers to ARV medication adherence for PLWHA. Additionally, the BSOMHIV Clinic utilized screening tools for substance use and mental health while the other barriers were self-report. This may have introduced recall error as well as social desirability bias.

Antiretroviral medication adherence was measured using patients' CD4 cut scores at week 21 and HIV viral load cut scores at week 21. However, this study acknowledges that CD4 and viral may be capturing ARV medication adherence differently. Furthermore, research suggests that in clinical trials with short follow-up periods, viral load is often treated as an

endpoint, while CD4 count is viewed as a covariate (Yu & Wu, 2017). Future studies may consider treating viral load as a response variable and adding CD4 to the model as a covariate.

Yu and Wu (2017) suggest that interpretation error can occur in HIV/AIDS research due to measurement errors, outliers, and missing data. Although the current study dichotomized data to reduce the influence of outliers, the archival study design did present instances of missing data. Absent observations on study variables decreased the final sample size and weakening the statistical power of the results. Despite missing data, this study was able to use stratified, random sampling which increases generalizability.

Statistical analysis. A limitation of logistic regression is the loss of information due to reducing variables to dichotomous levels (Ranganathan, Pramesh, & Aggarwal, 2017). Although this study's dichotomous cutoffs for patients' CD4 counts and HIV viral loads were in keeping with past research, this study was unable to explore the amount of change in each outcome variables and if changes occurred in one or more of the predictive variables. Future research should consider using multiple linear regression to explore the relationship between patients' CD4 count, HIV viral load and one or more explanatory variables (e.g., alcohol use). Further, multiple linear regression would allow for CD4 counts and HIV viral loads to be analyzed as a continuous variable.

Another limitation of logistic regression is equations derived for a specific sample may not apply to other samples (Ranganathan et al., 2017). For this study, logistic regression models may only be applicable to samples with similar sociodemographic variables. Future studies may consider using repeated measures, which allows for multiple measurements of each subject/patient (Moore et al., 2009). Repeated measures would also assist in controlling for factors that cause variability between subjects, resulting in a more statistically powerful analysis.

Even with these limitations, logistic regression was still considered an appropriate statistical analysis for this study. Specifically, logistic regression provides model percentages and makes meaningful predictions of biological variables (Zhao, Chen, & Schaffner, 2001).

Implications for Healthcare Professionals, Counselors, and Counselor Educators

The results of this study have implications for healthcare professionals, counselors, and counselor educators. More specifically, finding substance use as a barrier to medication adherence supports previous research that underscores the need for healthcare professionals and counselors to address substance use concerns in PLWHA. For example, Grau et al. (2017) found that PLWHA with co-occurring substance use disorders were more likely to acquire opportunistic infections and experience disease progression than PLWHA without-occurring substance use disorders. Self-determination theory may provide an explanation for this trend. Specifically, those with substance use concerns may experience more difficulty attending to basic needs (e.g., housing, financial stability), which can diminish individuals' capacity to attend to higher-order psychological concerns (i.e., autonomy, competence, and relatedness) that ensure overall wellbeing. However, utilizing a multidisciplinary approach may alleviate these concerns by addressing basic needs while concurrently supporting patients' ability to attend to higher-order concerns. For instance, patients may present with concerns related to housing and the subsequent stress of homelessness. In this situation, case managers may link patients to temporary housing while behavioral health specialists provide psycho-education regarding the interplay of stress and HIV and suggest effective coping skills.

Furthermore, research recommends screening for substance use should be standard practice when treating PLWHA (Kader, Govender, Seedat, Koch, & Parry, 2015). Again, the current findings that substance use as a predictor of ARV medication non-adherence supports

this suggestion. Additionally, cross-training among health care providers and addiction counselors would assist in the identification and treatment of substance use concerns which in turn may improve medication adherence (Kader et al., 2015). Specifically, cross-training would consist of psychoeducation concerning the link between substance use and HIV and how to refer patients appropriately to different levels of substance use treatment within (e.g., smoking cessation sessions with an on-site behavioral health specialist) or beyond HIV clinics (e.g., inpatient substance abuse treatment facility). The *Annual Risk Assessment and Screening Tool* (Appendix B) used by healthcare professionals at the BSOMHIV Clinic is an example of how to incorporate substance use screening into the routine of clinical practice.

Healthcare professionals and counselors may utilize SDT as a theoretical framework for conceptualizing patients' motivation and innate tendency towards growth in supportive environments. From an SDT perspective, healthcare providers and counselors may understand how essential patients' motivation is for obtaining HIV/AIDS-related health goals (e.g., getting better, maintaining virological suppression).

In the current study, no difference was found when the BSOMHIV Clinic moved from a strength-based case management approach to a motivational interviewing approach. That is, medication adherence was high regardless of the approach used. Strength-based case management or motivational interviewing may offer healthcare providers and counselors with the clinical tools needed to help facilitate health-related behavioral changes including ARV medication adherence. Furthermore, recent research suggests that motivational interviewing training is most effective in altering the relational component (i.e., the patient-centered orientation) of trainees (Beach et al., 2018). Thus, the adoption of a patient-centered approach found in both strength-based case management and motivational interviewing may be the key to

115

healthcare professionals and counselors engaging PLWHA in the treatment process. Additionally, strengths-based case management, motivational interviewing, and SDT have many conceptual overlaps and promote similar themes to elicit change within supportive environments.

Given the number of individuals currently living with HIV/AIDS as well as the presentation of co-occurring psychosocial concerns (e.g., substance use, mental health, social stigma), it is likely that counselors are or will works with individuals who have a seropositive status (Rose, Sullivan, Hairston, Laux, & Pawelczak, 2015; Owen-Pugh & Baines, 2014). As such, counselors need an awareness of the unique counseling concerns that arise when working with PLWHA. This awareness begins during counselors' formal education. Counselor educators prepare students to serve as competent counselors who are capable of working with different populations (e.g., substance use, mental health) in an array of clinical settings (Council for Accreditation of Counseling and Related Educational Programs [CACREP], 2015). Research suggests that many clinicians do not receive adequate preparation during their graduate training to work with PLWHA (Joe & Foster, 2017).

One of the challenges counselor educators face is balancing the demands of accreditation standards for general counseling-related content, while also providing learning opportunities for special topics such as HIV/AIDS. While professional development and continuing education opportunities with an HIV/AIDS focus exist, there is no guarantee that counselors use these opportunities to obtain knowledge and skills needed to work effectively with PLWHA (Joe & Foster, 2017). Furthermore, counselor education programs with a clinical mental health or addictions focus may not incorporate strength-based case-management into their curriculum. As discussed previously, a strengths-based case management approach can be essential for PLWHA with biopsychosocial barriers to care.

Despite these challenges, counselor educators have the framework necessary to incorporate HIV/AIDS-specific learning. For instance, many courses in counselor education programs do include biopsychosocial case conceptualization (CACREP, 2015). This provides opportunities for counselor educators to engage students in case conceptualization activities that incorporates and discusses biopsychosocial concerns unique to PLWHA. As well, Section 2 of CACREP's (2015) 2016 standards of accreditation suggests "strategies for identifying and eliminating barriers, prejudices, and processes of intentional and unintentional oppression and discrimination" (p. 9) should be incorporated into the counseling curriculum. Counselor educators acting as supervisors for students have an opportunity to support students' self-exploration of their perceptions, attitudes, and biases regarding PLWHA. Finally, counselor educator can expand their experiential courses (i.e., practicum and internship) to include clinical settings in which counselors-in-training gain supervised exposure to working with PLWHA.

Recommendations for Future Research

This study provides a new understanding of the influence of biopsychosocial barriers and motivational interviewing to ARV medication adherence. Furthermore, this study found that patients with a substance use barrier are 8 to 10 times more likely to be virologically unsuppressed. Though the other five biopsychosocial variables were not significant, the results suggest that one or more of these barriers contribute to the influence of the substance use barrier on viral load. Further research on these variables is recommended. For instance, statistical analysis may treat barriers to physical health, mental health, housing, transportation, and employment as covariates that explain the influence of the substance use barrier. Additionally, as discussed previously future research should explore the relationship between barriers and medication adherence at intake as well as over time.

An emerging concept called *syndemics* is being discussed in HIV/AIDS-related literature. Specifically, syndemics refer to when two or more endemics or epidemics occur simultaneously and act synergistically (WHO et al., 2017). This suggests that HIV and other major biopsychosocial concerns (e.g., co-occurring sexually transmitted infections, substance use) do not occur in isolation and must be addressed comprehensively. For example, there is a growing rise in the number of individuals with opioid use concerns across the United States. Future research may consider looking at the regional biopsychosocial concerns (e.g., substance use) that may be synergistically influencing the effective treatment of HIV.

Finally, to determine the validity and reliability of the current study's results, replication is needed. Because this study used a secondary analysis of data collected, interpretation of results as applied to the research questions were limited. Specifically, there may be other important variables such as patients' self-reported adherence or patients' self-efficacy that were not available for the analysis. Additionally, as discussed previously, the data collected during this study was transformed to fit the research questions. Future studies should include primary data collection procedures that explore the relationship between biopsychosocial barriers, motivational interviewing and ARV medication adherence.

Conclusion

Adherence to antiretroviral medications is a complex issue for PLWHA. Research supports the success of antiretroviral medications for the management of HIV as a chronic illness (Palmisano & Vella, 2011). However, the effectiveness of ARV medications is contingent on a strict medication adherence regimen (HIV.gov, 2017a). Self-determination theory provides a theoretical framework that explains how healthcare professionals can work collaboratively (relatedness) with patients and empower them with the knowledge (competence) necessary to be

actively involved in the decisions about their HIV treatment (autonomy). However, PLWHA

may be unable to attend to these psychological needs due to unmet basic human needs. To foster

medication adherence with PLWHA, research encourages the use of non-judgmental, case

management model to address biopsychosocial concerns that may pose as barriers to HIV/AIDS

care (Broeckaert & Challacombe, 2015).

HIV/AIDS-related research is an ever-growing body of knowledge. The results provided

in this study illuminates one piece of a much larger paradigm. While statistical significance was

not found for many of the barriers, the current findings begin the discussion as to what the

barriers are for PLWHA. Specifically, substance use is an important barrier that warrants further

research for PLWHA with similar sociodemographics. Further, barriers to HIV/AIDS-related

care do not exist in isolation. Rather, they are interconnected. The results of the current study

suggest that the interconnectedness of barriers may be particularly true for PLWHA with

substance use concerns. This reiterates the importance of integrating multidisciplinary care into

HIV/AIDS treatment services, particularly in rural areas where access to healthcare may be

difficult or limited. Future research exploring substance use treatment and ARV medication

adherence in PLWHA is suggested.

References

Adakun, S. A., Siedner, M. J., Muzoora, C., Haberer, J. E., Tsai, A. C., Hunt, P. W., …

Bangsberg, D. R. (2013). Higher baseline CD4 cell count predicts treatment interruptions

and persistent viremia in patients initiating ARVs in rural Uganda. *Journal of Acquired*

Immune Deficiency Syndromes, *62*(3), 317–321.

http://doi.org/10.1097/QAI.0b013e3182800daf

AIDSInfo. (2017, November 28). *Preventing mother-to-child transmission of HIV* [webpage].

Retrieved from https://aidsinfo.nih.gov/understanding-hiv-aids/fact-

sheets/20/50/preventing-mother-to-child-transmission-of-hiv/

AIDSInfo. (2018, March 27). *Guidelines for the use of antiretroviral agents in adults and*

adolescents living with HIV [webpage]. Retrieved from

https://aidsinfo.nih.gov/guidelines/html/1/adult-and-adolescent-arv/0

AIDSVu.org (n.d.). *North Carolina highlights* [online interactive graph]. Retrieved from

https://aidsvu.org/state/north-carolina/

Allicock, M., Golin, C. E., Kaye, L., Grodensky, C., Blackman, L. T., & Thibodeaux, H. (2017).

SafeTalk: Training peers to deliver a motivational interviewing HIV prevention program.

Health Promotion Practice, *18*(3), 410-417. doi: 10.1177/1524839916663486

American Foundation for AIDS Research (2017, February). *Young People and HIV/AIDS*

[webpage]. Retrieved from http://amfar.org/About-HIV-and-AIDS/Young-People-and-

HIV/Young-People-and-HIV-AIDS/

Anglin, A. H., Reid, S. W., Short, J. C., Zachary, M. A., & Rutherford, M. W. (2017). An

archival approach to measuring family influence: An organizational identity perspective.

Family Business Review, 30(1), 19-36. doi: 10.1177/0894486516669254

Arozullah, A. M., Yarnold, P. R., Bennett, C. L., Soltysik, R. C., Wolf, M. S., Ferreira, R. M., . . .Davis, T. (2007). Development and validation of a short-form, rapid estimate of adult literacy in medicine. *Medical Care, 45*(11), 1026-1033. doi: 10.1097/MLR.0b013e3180616c1b

Ary, D., Jacobs, L. C., Sorensen, C., & Razavieh, A. (2010). *Introduction to research in education* (8th ed.). Australia: Wadsworth, Cengage Learning.

AVERT.org. (2017, August 15). *Funding for HIV and AIDS* [webpage]. Retrieved from https://www.avert.org/professionals/hiv-around-world/global-response/funding

AVERT.org. (2018a, January 2). *What are HIV and AIDS?* [webpage]. Retrieved from https://www.avert.org/about-hiv-aids/what-hiv-aids

AVERT.org. (2018b, January 24). *Starting antiretroviral treatment for HIV* [webpage]. Retrieved from https://www.avert.org/living-with-hiv/starting-treatment

AVERT.org. (2018c, March 9). *History of HIV and AIDS overview* [webpage]. Retrieved from https://www.avert.org/professionals/history-hiv-aids/overview

AVERT.org. (2018d, April 4). *HIV and AIDS in the United States of America (USA)* [webpage]. Retrieved from https://www.avert.org/professionals/hiv-around-world/western-central-europe-north-america/usa

AVERT.org. (2018e, April 11). *Women and girls, HIV and AIDS* [webpage]. Retrieved from https://www.avert.org/professionals/hiv-social-issues/key-affected-populations/women

Bartlett, J. G. (2006). *Ten years of HAART: Foundation for the future* [webpage]. Retrieved from http://www.medscape.org/viewarticle/523119

Basavaraj, K. H., Navya, M. A., & Rashmi, R. (2010). Quality of life in HIV/AIDS. *Indian Journal of Sexually Transmitted Diseases*, *31*(2), 75-80. doi: 10.4103/0253-7184.74971

Beach, M. C., Laws, M. B., Rose, G., Roter, D., Lee, Y., Chander, G., . . . Wilson, I. B. (2018).

    Effects of minimal versus intensive intervention to enhance motivational interviewing in

    HIV care. *AIDS and Behavior*, *22*(1), 276-286. doi: 10.1007/s10461-017-1794-6

Beasley, E. K., & Garn, A. C. (2013). An investigation of adolescent girls' global self-concept,

    physical self-concept, identified regulation, and leisure-time physical activity in physical

    education. *Journal of Teaching in Physical Education, 32*(3), 237-252. doi:

    http://dx.doi.org/10.1123/jtpe.32.3.237

Bennett, R. L. (2010). *An overview of HIV housing in the south* [PowerPoint slides]. Retrieved

    from http://adph.org/ALPHTN/assets/072010Bennett.pdf

Bing, E. G., Burnam, A., Longshore, D., Fleishman, J. A., Sherbourne, C. D., London, A. S., …,

    Shapiro, M. (2001). JAMA, the Journal of the American Medical Association, 58(8),

    721-728. Retrieved from http://archpsyc.jamanetwork.com/article.aspx?articleid=205826

Brennan-Ing, M., Seidel, L., Rodgers, L., Ernst, J., Wirth, D., Tietz, D., . . . Karpiak, S. E.

    (2016). The impact of comprehensive case management on HIV client outcomes. *PloS*

    One, 11(2), e0148865. doi:10.1371/journal.pone.0148865

Britt, E., & Blampied, N. M. (2010). Motivational interviewing training: A pilot study of the

    effects on practitioner and patient behaviour. *Behavioural and Cognitive Psychotherapy,*

    38(2), 239-244. doi: 10.1017/S1352465809990531

Brody, A. E. (2009). Motivational interviewing with a depressed adolescent. *Journal of Clinical*

    Psychology, 65(11), 1168-1179. doi:10.1002/jclp.20636

Broeckaert, L., Challacombe, L. (2015). Does multidisciplinary care improve health outcomes

    among people living with HIV and or HCV? A review of the evidence. *Prevention in*

Focus. Retrieved from http://www.catie.ca/en/pif/fall-2015/does-multidisciplinary-care-improve-health-outcomes-among-people-living-hiv-andor-hcv-

Brown, M. T., & Bussell, J. K. (2011). Medication adherence: WHO cares? *Mayo Clinic Proceedings, 86*(4), 304-314. doi: 10.4065/mcp.2010.0575

Brown, K. W., & Ryan, R. M. (2004). Fostering healthy self-regulation from within and without: A self-determination theory perspective. In A. P. Linley & S. Joseph (Eds.), *Positive psychology in practice* (pp. 105-124). New Jersey: John Wiley & Sons, Inc.

Buot, M. G., Docena, J. P., Ratemo, B. K., Bittner, M. J., Burlew, J. T., Nuritdinov, A. R., & Robbins, J. R. (2014). Beyond race and place: Distal sociological determinants of HIV disparities. *PLoS One*, *9*(4), 1-16. doi: 10.1371/journal.pone.0091711

Burns, R. B., Burns, R. A. *Business research methods and statistics using SPSS* (2008). Portland: Ringgold Inc.

Case Management Society of America (2016). *Home* [webpage]. Retrieved from http://www.cmsa.org/Home/CMSA/WhatisaCaseManager/tabid/224/Default.aspx

Centers for Disease Control and Prevention (2001). HIV/AIDS – United States, 1981-2000. *Morbidity and Mortality Weekly Report*, *50*(21), 430-434. Retrieved from https://www.cdc.gov/mmwr/pdf/wk/mm5021.pdf

Centers for Disease Control and Prevention. (2017a, November 30). *Statistics overview* [webpage]. Retrieved from https://www.cdc.gov/hiv/statistics/overview/index.html

Centers for Disease Control and Prevention. (2017b, December 18). *Basic statistics* [webpage]. Retrieved from https://www.cdc.gov/hiv/basics/statistics.html

Centers for Disease Control and Prevention. (2018a, February 12). *HIV among*

    Hispanics/Latinos [webpage]. Retrieved from

    https://www.cdc.gov/hiv/group/racialethnic/hispaniclatinos/

Centers for Disease Control and Prevention. (2018b, February 12). *HIV among people aged 50*

    and over [webpage]. Retrieved from

    https://www.cdc.gov/hiv/group/age/olderamericans/index.html

Centers for Disease Control and Prevention. (2018c, February 12). *HIV among youth* [webpage].

    Retrieved from https://www.cdc.gov/hiv/group/age/youth/index.html

Centers for Disease Control and Prevention. (2018d, February 14). *HIV among African*

    Americans [webpage]. Retrieved from

    https://www.cdc.gov/hiv/group/racialethnic/africanamericans/index.html

Centers for Disease Control and Prevention. (2018e, February 27). *HIV among gay and bisexual*

    men [webpage]. Retrieved from https://www.cdc.gov/hiv/group/msm/index.html

Centers for Disease Control and Prevention. (2018f, March 9). *HIV among women* [webpage].

    Retrieved from https://www.cdc.gov/hiv/group/gender/women/index.html

Centers for Disease Control and Prevention. (2018g, March 16). *About HIV/AIDS* [webpage].

    Retrieved from https://www.cdc.gov/hiv/basics/whatishiv.html

Centers for Disease Control and Prevention. (2018h, March 20). *HIV in the United States by*

    geographic distribution [webpage]. Retrieved from

    https://www.cdc.gov/hiv/statistics/overview/geographicdistribution.html

Centers for Disease Control and Prevention. (2018i, March 21). *HIV among pregnant women,*

    infants, and children [webpage]. Retrieved from

    https://www.cdc.gov/hiv/group/gender/pregnantwomen/index.html

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J.,…

    Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need

    strength across four cultures. *Motivation and Emotion, 39*(2), 216-236. doi:

    10.1007/s11031-014-9450-1

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: Opportunities and

    implementation. *Shanghai Archives of Psychiatry, 26*(6), 371-375. doi:

    10.11919/j.issn.1002-0829.214171

Colasanti, J., Stahl, N., Farber, E. W., del Rio, C., & Armstrong, W. S. (2017). An exploratory

    study to assess individual and structural level barriers associated with poor retention and

    re-engagement in care among persons living with HIV/AIDS. *JAIDS Journal of Acquired*

    Immune Deficiency Syndromes, 74 Suppl 2, S113-S120.

    doi:10.1097/QAI.0000000000001242

Corey, G., Corey, M., & Callanan, P. (2011). *Issues and ethics in the helping profession* (8th

    ed.). Belmont, CA: Brooks/Cole, Cengage Learning.

Council for Accreditation of Counseling and Related Educational Programs. (2015). *2016*

    CACREP Standards. Retrieved from http://www.cacrep.org/wp-

    content/uploads/2012/10/2016-Standards-with-Glossary.pdf

Craw, J. A., Gardner, L. I., Marks, G., Rapp, R. C., Bosshart, J., Duffus, W. A., . . . Schmitt, K.

    (2008). Brief strengths-based case management promotes entry into HIV medical care:

    Results of the antiretroviral treatment access study-II. *JAIDS Journal of Acquired*

    Immune Deficiency Syndromes, 47(5), 597-606. doi:10.1097/QAI.0b013e3181684c51

Crowe, A., & Parmenter, A. S. (2012). Creative approaches to motivational interviewing:

       Addressing the principles. *Journal of Creativity in Mental Health, 7*(2), 124-140. doi:

       10.1080/15401383.2012.684662

Dahlbeck, D. T., & Lease, S. H. (2010). Career issues and concerns for persons living with

       HIV/AIDS. *Career Development Quarterly*, *58*(4), 359-368. Retrieved from

       http://search.proquest.com/docview/501347452/fulltextPDF?accountid=10639

Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum Publishing Co.

Deci, E. L., & Ryan, R. M. (1980). The empirical exploration of intrinsic motivational processes.

       In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol *13*, pp. 39-80).

       New York: Academic Press.

Deci, E. L., & Ryan, R. M. (1985a). *Intrinsic motivation and self-determination in human*

       behavior. New York: Plenum.

Deci, E. L., & Ryan, R. M. (1985b). The general causality orientations scale: Self-determination

       in personality. *Journal of Research in Personality*, *19*, 109-134.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the

       self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. doi:

       10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY:

       University of Rochester Press.

Deci, E. L., & Ryan, R. M. (2014). Autonomy and need satisfaction in close relationships:

       Relationships motivation theory. In Weinstein, Netta (Ed.), *Human Motivation and*

       Interpersonal Relationships (pp. 53-73). Dordrecht: Springer. doi: 10.1007/978-94-017-

       8542-6

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *The Educational Psychologist*, *26*(3&4), 325-346. doi: 10.1080/00461520.1991.9653137

Deci, E. L., & Vansteenkiste, M. (2004). Self-determination theory and basic need satisfaction: Understanding human development in positive psychology. *Ricerche di Psichologia*, *27*(1), 17-34. Retrieved from http://selfdeterminationtheory.org/SDT/documents/2004_DeciVansteenkiste_SDTandBasicNeedSatisfaction.pdf

DeLorenze, G. N., Tsai, A., Horberg, M. A., & Quesenberry, J., Charles P. (2014). Cost of care for HIV-infected patients with co-occurring substance use disorder or psychiatric disease: Report from a large, integrated health plan. *AIDS Research and Treatment*, *2014*, 570546. doi: 10.1155/2014/570546

Deponte, A. (2004). Linking motivation to personality: Causality orientations, motives and self-descriptions. *European Journal of Personality, 18*(1), 31-44. doi:10.1002/per.503

Diabaté, S., Alary, M., & Koffi, C. K. (2007). Determinants of adherence to highly active antiretroviral therapy among HIV-1-infected patients in Côte d'Ivoire. *AIDS*, *21*(13), 1799-1803. doi: 10.1097/QAD.0b013e3282a5667b

DiCicco, L., Unterberger, H., & Mack, J. E. (1978). Confronting denial: An alcoholism intervention strategy. *Psychiatric Annals, 8*(11), 54-64. doi: 10.3928/0048-5713-19781101-08

DiIorio, C., Resnicow, K., McDonnell, M., Soet, J., McCarty, F., & Yeager, K. (2003). Using motivational interviewing to promote adherence to antiretroviral medications: A pilot

study. *Journal of the Association of Nurses in AIDS Care, 14*(2), 52-62. doi:

10.1177/1055329002250996

DiIorio, C., McCarty, F., Resnicow, K., McDonnell Holstad, M., Soet, J., Yeager, K.,…

Lundberg, B. (2008). Using motivational interviewing to promote adherence to

antiretroviral medications: A randomized controlled study. *AIDS Care, 20*(3), 273-283.

doi: 10.1080/09540120701593489

Douaihy, A., Kelly, T. M., & Gold, M. A. (2015). *Motivational interviewing: A guide for

medical trainees*. US: Oxford University Press.

Dwyer, M. S., Levy, R. A., & Menander, K. B. (1986). Improving medication compliance

through the use of modern dosage forms. *Journal of Pharmacy Technology, 2*(4), 166-

170. doi: 10.1177/875512258600200407

Dyson, T. (2003). HIV/AIDS and urbanization. *Population and Development Review, 29*(3),

427-442. doi: 10.1111/j.1728-4457.2003.00427.x

Earnshaw, V. A., Bogart, L. M., Dovidio, J. F., & Williams, D. R. (2013). Stigma and

racial/ethnic HIV disparities: Moving toward resilience. *American Psychologist*, *68*(4),

225-236. doi: 10.1037/a0032705

Earnshaw, V. A., & Chaudoir, S. R. (2009). From conceptualizing to measuring HIV stigma: A

review of HIV stigma mechanism measures. *AIDS and Behavior*, *13*(6), 1160-1177. doi:

10.1007/s10461-009-9593-3

Engel, G. (n.d.). *The Biopsychosocial Approach*. [PDF file]. Retrieved from

https://www.urmc.rochester.edu/medialibraries/urmcmedia/education/md/documents/bio

psychosocial-model-approach.pdf

Evangelisto, M. (1996). Death with dignity end-of-life issues for the HIV/AIDS patient. *Journal of Psychosocial Nursing and Mental Health Services*, *34*(6), 45-47. Retrieved from http://search.proquest.com/docview/1024299052/fulltextPDF?accountid=10639

Evren, C., Can, Y., Yilmaz, A., Olvali, E., Citingok, S. Karabulut, V., & Mutlu, E. (2013). Psychometric properties of The Drug Abuse Screening Test (DAST-10) in heroin dependent adults and adolescents with drug use disorder. *The Journal of Psychiatric and Neurological Sciences*, *26*, 351-359. doi: 10.5350/DAJPN2013260404

Ford, M. A., & Spicer, C. M. (Eds.) (2012). *Monitoring HIV care in the United States: Indicators and data systems*. Washington, D.C: National Academies Press.

Galvan, F. H., Burnam, M. A., & Bing, E. G. (2003). Co-occurring psychiatric symptoms and drug dependence or heavy drinking among HIV-positive people. *Journal of Psychoactive Drugs*, *35*(1), 153-160. doi: 10.1080/02791072.2003.10400510

Gardner, L. I., Metsch, L. R., Anderson-Mahoney, P., Loughlin, A. M., Del Rio, C., Strathdee, S., . . . Antiretroviral Treatment and Access Study (ARTAS) Study Group. (2005). Efficacy of a brief case management intervention to link recently diagnosed HIV-infected persons to care. *AIDS, 19*(4), 423-431. doi:10.1097/01.aids.0000161772.51900.eb

Garson, G. D. (2016). *Logistic regression: Binary and multinomial* [PDF file]. Retrieved from http://www.statisticalassociates.com/

Goldstein, K. (1939). *The organism: A holistic approach to biology derived from pathological data in man*. Cincinnati: American Book Company.

Gil, E. F., & Bob, S. (1999). Culturally competent research: An ethical perspective. *Clinical Psychology Review, 19*(1), 45-55.

Grau, L. E., Griffiths-Kundishora, A., Heimer, R., Hutcheson, M., Nunn, A., Towey, C., &
Stopka, T. J. (2017). Barriers and facilitators of the HIV care continuum in southern New
England for people with drug or alcohol use and living with HIV/AIDS: Perspectives of
HIV surveillance experts and service providers. *Addiction Science & Clinical Practice*,
12(24). 1-14. doi: 10.1186/s13722-017-0088-7

Gunnell, K. E., Crocker, P. R. E., Mack, D. E., Wilson, P. M., & Zumbo, B. D. (2014). Goal
contents, motivation, psychological need satisfaction, well-being and physical activity: A
test of self-determination theory over 6 months. *Psychology of Sport and Exercise, 15*(1),
19-29. doi: 10.1016/j.psychsport.2013.08.005

Gunnell, K. E., Crocker, P. R. E., Wilson, P. M., Mack, D. E., & Zumbo, B. D. (2013).
Psychological need satisfaction and thwarting: A test of basic psychological needs theory
in physical activity contexts. *Psychology of Sport & Exercise, 14*(5), 599. doi:
10.1016/j.psychsport.2013.03.007

Hadden, B. W., Rodriguez, L. M., Knee, C. R., & Porter, B. (2015). Relationship autonomy and
support provision in romantic relationships. *Motivation and Emotion, 39*(3), 359-373.
doi: 10.1007/s11031-014-9455-9

Hanna, D. B., Selik, R. M., Tang, T., & Gange, S. J. (2012). Disparities among US states in HIV-
related mortality in persons with HIV infection, 2001-2007. *AIDS, 26*(1), 95-103.
doi:10.1097/QAD.0b013e32834dcf87

Health Resources & Services Administration. (2016). *National HIV/AIDS strategy: Updated to
2020* [webpage]. Retrieved from https://hab.hrsa.gov/about-ryan-white-hivaids-
program/national-hivaids-strategy-updated-2020

Henry J. Kaiser Family Foundation (2014, March). *Women and HIV/AIDS in the United States* [PDF file]. Retrieved from https://kaiserfamilyfoundation.files.wordpress.com/2014/03/6092-women-and-hivaids-in-the-united-states1.pdf

Henry J. Kaiser Family Foundation (2016, June 10). *U.S. federal funding for HIV/AIDS: Trends over time* [webpage]. Retrieved from http://kff.org/global-health-policy/fact-sheet/u-s-federal-funding-for-hivaids-trends-over-time/

Henry J. Kaiser Family Foundation (2017, February 7). *Black Americans and HIV/AIDS: The basics* [webpage]. Retrieved from http://kff.org/hivaids/fact-sheet/black-americans-and-hivaids-the-basics/

Herrmann, S., McKinnon, E., Hyland, N. B., Lalanne, C., Mallal, S., Nolan, D… Duracinsky, M. (2013). HIV-related stigma and physical symptoms have a persistent influence on health-related quality of life in Australians with HIV infection. *Health and Quality of Life Outcomes, 11*(1), 56-56. doi: 10.1186/1477-7525-11-56

Hill, S., & Kavookjian, J. (2012). Motivational interviewing as a behavioral intervention to increase HAART adherence in patients who are HIV-positive: A systematic review of the literature. *AIDS Care, 24*(5), 583-592. doi: 10.1080/09540121.2011.630354

HIV.gov. (2016). *A timeline of HIV/AIDS* [PDF file]. Retrieved from https://www.hiv.gov/sites/default/files/aidsgov-timeline.pdf

HIV.gov. (2017a, May 15). *HIV treatment overview* [webpage]. Retrieved from https://www.hiv.gov/hiv-basics/staying-in-hiv-care/hiv-treatment/hiv-treatment-overview

HIV.gov. (2017b, May 15) *Housing and health* [webpage]. Retrieved from

   https://www.hiv.gov/hiv-basics/living-well-with-hiv/taking-care-of-yourself/housing-

   and-health

HIV.gov. (2017c, May 15). *How is HIV transmitted?* [webpage]. Retrieved from

   https://www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/how-is-hiv-transmitted

HIV.gov. (2017d, May 15). *Seeing your health care provider* [webpage]. Retrieved from

   https://www.hiv.gov/hiv-basics/staying-in-hiv-care/provider-visits-and-lab-test/seeing-

   your-health-care-provider

HIV.gov. (2017e, May 15). *What to expect at your first HIV care visit* [webpage]. Retrieved

   https://www.hiv.gov/hiv-basics/starting-hiv-care/getting-ready-for-your-first-visit/what-

   to-expect-at-your-first-hiv-care-visit

HIV.gov. (2017f, November 20). *Global statistics* [webpage]. Retrieved from

   https://www.hiv.gov/hiv-basics/overview/data-and-trends/global-statistics

HIV.gov. (2017g, December 5). *U.S. statistics* [webpage]. Retrieved from

   https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics

Hoffmann, C. J., Mabuto, T., Ginindza, S., Fielding, K. L., Kubeka, G., Dowdy, D. W., . . .

   Charalambous, S. (2017). Strategies to accelerate HIV care and antiretroviral therapy

   initiation after HIV diagnosis: A randomized trial. *JAIDS Journal of Acquired Immune

   Deficiency Syndromes, 75*(5), 540-547. doi:10.1097/QAI.0000000000001428

Holstad, M. M., DiIorio, C., & McCarty, F. (2011). Adherence, sexual risk, and viral load in

   HIV-infected women prescribed antiretroviral therapy. *AIDS Patient Care and STDs,

   25*(7), 431-438. doi: 10.1089/apc.2010.0331

Holtzman, C. W., Brady, K. A., & Yehia, B. R. (2015). Retention in care and medication

adherence: Current challenges to antiretroviral therapy success. *Drugs, 75*(5), 445-454.

doi:10.1007/s40265-015-0373-2

Information Evidence and Research (image creator). (2016). *Adult HIV prevalence (15-49*

years), 2015 by WHO region [JPG file]. World Health Organization. Retrieved from

http://www.who.int/gho/hiv/hiv_013.jpg?ua=1

Ironson, G., O'Cleirigh, C., Fletcher, M. A., Laurenceau, J. P., Balbin, E., Klimas, N., . . .

Solomon, G. (2005). Psychosocial factors predict CD4 and viral load change in men and

women with human immunodeficiency virus in the era of highly active antiretroviral

treatment. *Psychosomatic Medicine*, *67*(6), 1013-1021. doi:

10.1097/01.psy.0000188569.58998.c8

Joe, J. R., & Foster, V. A. (2017). Moral development, HIV/AIDS knowledge, and attitude

toward HIV/AIDS among counseling students in the United States. *International Journal*

for the Advancement of Counselling, 39(3), 295-310. doi:10.1007/s10447-017-9299-6

Joint United Nations Programme on HIV/AIDS [UNAIDS] (2016). *Get on the fast-track: The*

life-cycle approach to HIV [PDF file]. Retrieved from

http://www.unaids.org/sites/default/files/media_asset/Get-on-the-Fast-Track_en.pdf

Joint United Nations Programme on HIV/AIDS [UNAIDS] (2017). *AIDS by the numbers* [PDF

file]. Retrieved from

http://www.unaids.org/sites/default/files/media_asset/AIDS_by_the_numbers_2015_en.p

df

Kader, R., Govender, R., Seedat, S., Koch, J. R., & Parry, C. (2015). Understanding the impact of hazardous and harmful use of alcohol and/or other drugs on ARV adherence and disease progression. *PLoS One*, *10*(5), e0125088. doi: 10.1371/journal.pone.0125088

Kalichman, S. C., Simbayi, L. C., Cloete, A., Mthembu, P. P., Mkhonta, R. N., & Ginindza, T. (2009). Measuring AIDS stigmas in people living with HIV/AIDS: The internalized AIDS-related stigma scale. *AIDS Care*, *21*(1), 87-93. doi: 10.1080/09540120802032627

Kennedy, S., Goggin, K., & Nollen, N. (2004). Adherence to HIV medications: Utility of the theory of self-determination. *Cognitive Therapy and Research, 28*(5), 611-628. doi: 10.1023/B:COTR.0000045568.95219.e2

Kessler, E. H. (2013). Self-determination theory. In *Encyclopedia of management theory: Volume two*. (Vol. 2, pp. 686-690). Los Angeles: Sage Reference.

Kim, E. K. (2015, November 17). *Online interview*. Retrieved from http://www.today.com/health/charlie-sheen-reveals-hes-hiv-positive-today-show-exclusive-t56391

Ko, N., Liu, H., Lai, Y., Pai, Y., & Ko, W. (2013). Case management interventions for HIV-infected individuals. *Current HIV/AIDS Reports, 10*(4), 390-397. doi:10.1007/s11904-013-0183-7

Koestner, R., & Zuckerman, M. (1994). Causality orientations, failure, and achievement. *Journal of Personality, 62*(3), 321-346. doi: 10.1111/j.1467-6494.1994.tb00300.x

Korte, K. J., Capron, D. W., Zvolensky, M., & Schmidt, N. B. (2013). The Fagerström test for nicotine dependence: Do revisions in the item scoring enhance the psychometric properties? *Addictive Behaviors, 38*(3), 1757-1763. doi: 10.1016/j.addbeh.2012.10.013

Krummenacher, I., Cavassini, M., Bugnon, O., & Schneider, M. P. (2011). An interdisciplinary HIV-adherence program combining motivational interviewing and electronic antiretroviral drug monitoring. *AIDS Care, 23*(5), 550-561. doi: 10.1080/09540121.2010.525613

Langebeek, N., Gisolf, E. H., Reiss, P., Vervoort, S. C., Hafsteinsdóttir, T. B., Richter, C., . . . Nieuwkerk, P. T. (2014). Predictors and correlates of adherence to combination antiretroviral therapy (ART) for chronic HIV infection: A meta-analysis. *BMC Medicine*, *12*(1), 142. 10.1186/s12916-014-0142-1

Löwe, B., Wahl, I., Rose, M., Spitzer, C., Glaesmer, H., Wingenfeld, K.,… Brähler, E. (2010). A 4-item measure of depression and anxiety: Validation and standardization of the patient health questionnaire-4 (PHQ-4) in the general population. *Journal of Affective Disorders, 122*(1), 86-95. doi: 10.1016/j.jad.2009.06.019

Lynam, I., Catley, D., Goggin, K., Rabinowitz, J. L., Gerkovich, M. M., Williams, K.,… MOTIV8. (2009). Autonomous regulation and locus of control as predictors of antiretroviral medication adherence. *Journal of Health Psychology, 14*(4), 578-586. doi: 10.1177/1359105309103577

Machtinger, E. L., & Bangbberg, D. R. (2006, January). *Adherence to HIV antiretroviral therapy* [webpage]. Retrieved from http://hivinsite.ucsf.edu/InSite?page=kb-03-02-09#S6.3X

Markland, D., Ryan, R. M., Tobin, V. J., & Rollnick, S. (2005). Motivational interviewing and Self–Determination theory. *Journal of Social and Clinical Psychology, 24*(6), 811-831. doi: 10.1521/jscp.2005.24.6.811

McLachlan, S., Spray, C., & Hagger, M. S. (2011). The development of a scale measuring

integrated regulation in exercise: Measuring integrated regulation. *British Journal of

Health Psychology, 16*(4), 722-743. doi: 10.1348/2044-8287.002009

Miller, W. R. (1983). Motivational interviewing with problem drinkers. *Behavioural and

Cognitive Psychotherapy, 11*(2), 147-172. doi: 10.1017/S0141347300006583

Miller, W. R., & Moyers, T. B. (2006). Eight stages in learning motivational interviewing.

Journal of Teaching in the Addictions, 5(1), 3-17. doi: 10.1300/J188v05n01_02

Miller, W. R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change

addictive behavior*. New York: Guilford Press.

Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change*

(2nd ed.). New York: Guilford Press.

Miller, W. R., & Rollnick, S. (2009). Ten things that motivational interviewing is not.

Behavioural and Cognitive Psychotherapy, 37(2), 129-140. doi:

10.1017/S1352465809005128

Miller, W. R., & Rollnick, S. (2012). Meeting in the middle: Motivational interviewing and self-

determination theory. *The International Journal of Behavioral Nutrition and Physical

Activity, 9*(1), 25-25. doi: 10.1186/1479-5868-9-25

Miller, W. R., & Rollnick, S. (2013). *Motivational interviewing: Helping people change* (3rd

ed.). New York: Guilford Press.

Milloy, M-J., Marshall, B. D. L., Montaner, J., & Wood, E. (2012). Housing status and the health

of people living with HIV/AIDS. *Current HIV/AIDS Reports, 9*(4), 364-374. doi:

10.1007/s11904-012-0137-5

Moore, D. M., Hogg, R. S., Yip, B., Wood, E., Tyndall, M., Braitstein, P., & Montaner, J. S. G. (2005). Discordant immunologic and virologic responses to highly active antiretroviral therapy are associated with increased mortality and poor adherence to therapy. *Journal of Acquired Immune Deficiency Syndromes*, *40*(3), 288-293. doi: 10.1097/01.qai.0000182847.38098.d1

Moore, D. S., McCabe, G. P., & Craig, B. A. (2009). *Introduction to the practice of statistics* (6th ed.). New York: W.H. Freeman and Co.

Moyers, T.B., Manuel, J.K., & Ernst, D. (2014). *Motivational Interviewing Treatment Integrity Coding Manual 4.1*. Unpublished manual.

Moyers, T. B., & Rollnick, S. (2002). A motivational interviewing perspective on resistance in psychotherapy. *Journal of Clinical Psychology, 58*(2), 185-193. doi: 10.1002/jclp.1142

Murphy, D. A., Greenwell, L., & Hoffman, D. (2002a). Factors associated with antiretroviral adherence among HIV-infected women with children. *Women Health, 36*(1), 97-111. doi: 10.1300/J013v36n01_07

Murphy, D. A., Lu, M. C., Martin, D., Hoffman, D., & Marelich, W. D. (2002b). Results of a pilot intervention trial to improve antiretroviral adherence among HIV-positive patients. *Journal of the Association of Nurses in AIDS Care, 13*(6), 57-69. doi: 10.1177/1055329002238026

National Institute on Drug Abuse. (n.d.). *DAST-10* [PDF file]. Retrieved from https://www.drugabuse.gov/sites/default/files/dast-10.pdf

National Latino AIDS Awareness Day. (n.d.). *A national perspective of the HIV/AIDS epidemic on Hispanics/Latinos in the U.S.* [PDF file]. Retrieved from https://www.latinoaids.org/esp/downloads/hiv_on_latinos_us.pdf

New York State Department of Health AIDS Institute. (2006). *Standards for HIV/AIDS case management.* [PDF file]. Retrieved from

https://www.health.ny.gov/diseases/aids/providers/standards/casemanagement/docs/case

managementstandards.pdf

Nicholls, J. (1984). Conceptions of ability and achievement motivation. In R. Ames & C. Ames (Eds.), *Research on motivation in education: Student motivation* (Vol. 1, pp. 39-73). New York: Academic Press.

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, *7*(2), 133-144. doi: 10.1177/1477878509104318

North Carolina Department of Health and Human Services, Communicable Disease Branch. (2012). *North Carolina epidemiologic profile for HIV/STD prevention & care planning* [PDF file]. Retrieved from

http://epi.publichealth.nc.gov/cd/stds/figures/Epi_Profile_2012.pdf

North Carolina Department of Health and Human Services, Communicable Disease Branch. (2016). *HIV and women in North Carolina, Reported HIV case data, 2014* [PDF file]. Retrieved from

http://epi.publichealth.nc.gov/cd/stds/figures/factsheet_HIVandWomenNC_2014.pdf

North Carolina Department of Health and Human Services, Communicable Disease Branch. (2017). *HIV fact sheet* [PDF file]. Retrieved from

http://epi.publichealth.nc.gov/cd/stds/figures/factsheet_HIV_2015_rev032017.pdf

Office of National AIDS Policy. (2015). *National HIV/AIDS strategy: Updated to 2020* [PDF file]. Retrieved from https://files.hiv.gov/s3fs-public/nhas-update.pdf

Olesen, M. H., Thomsen, D. K., Schnieber, A., & Tønnesvang, J. (2010). Distinguishing general causality orientations from personality traits. *Personality and Individual Differences, 48*(5), 538-543. doi: 10.1016/j.paid.2009.11.032

Owen-Pugh, V., & Baines, L. (2014). Exploring the clinical experiences of novice counsellors working with LGBT clients: Implications for training. *Counselling and Psychotherapy Research, 14*(1), 19-28. doi:10.1080/14733145.2013.782055

Palmisano, L., & Vella, S. (2011). A brief history of antiretroviral therapy of HIV infection: Success and challenges. *Annali Dell'Istituto Superiore Di Sanità, 47*(1), 44-48. doi: 10.4415/ANN_11_01_10

Pasternak, A. O., Bruin, M. d., Bakker, M., Berkhout, B., & Prins, J. M. (2015). High current CD4+ T cell count predicts suboptimal adherence to antiretroviral therapy: E0140791. *PLoS One, 10*(10), 1-11. doi: 10.1371/journal.pone.0140791

Paterson, D. L., Swindells, S., Mohr, J., Brester, M., Vergis, E. N., Squier, C., . . . Hudson, B. (2000). Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Annals of Internal Medicine*, *133*(1), 21-30. doi: 10.7326/0003-4819-133-1-200007040-00004

Patrick, H., & Williams, G. C. (2012). Self-determination theory: Its application to health behavior and complementarity with motivational interviewing. *International Journal of Behavioral Nutrition and Physical Activity*, *9*(1), 1-12. doi: 10.1186/1479-5868-9-18

Pellowski, J. A. (2013). Barriers to care for rural people living with HIV: A review of domestic research and health care models. *Journal of the Association of Nurses in AIDS Care, 24*(5), 422-437. doi: 10.1016/j.jana.2012.08.007

Perls, F.S., Hefferline, R.F., & Goodman, P. *Gestalt Therapy: Excitement and Growth in the Human Personality*. New York: Julian Press.

Pettinati, H. M., O'Brien, C. P., & Dundon, W. D. (2013). Current status of co-occurring mood and substance use disorders: A new therapeutic target. *American Journal of Psychiatry*, *170*(1), 23-30. doi: 10.1176/appi.ajp.2012.12010112

Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities Press.

Population Action International (2011). *Why population matters to infectious diseases and HIV/AIDS* [PDF file]. Retrieved from http://pai.org/wp-content/uploads/2012/02/PAI-1293-DISEASE_compressed.pdf

Portillo, C. J., Holzemer, W. L., & Chou, F. (2007). HIV symptoms. *Annual Review of Nursing Research*, *25*, 259-291. Retrieved from http://search.proquest.com/docview/197287160/fulltextPDF?accountid=10639

Quinlivan, E. B., Messer, L. C., Adimora, A. A., Roytburd, K., Bowditch, N., Parnell, H., . . . Pierce, J. K. (2013). Experiences with HIV testing, entry, and engagement in care by HIV-infected women of color, and the need for autonomy, competency, and relatedness. *AIDS Patient Care and STDs, 27*(7), 48-415. doi: 10.1089/apc.2012.0434

Ranganathan, P., Aggarwal, R., & Pramesh, C. (2017). Common pitfalls in statistical analysis: Measures of agreement. *Perspectives in Clinical Research, 8*(4), 187-191. doi:10.4103/picr.PICR_123_17

Reif, S., Golin, C. E., & Smith, S. R. (2005). Barriers to accessing HIV/AIDS care in North Carolina: Rural and urban differences. *AIDS Care, 17*(5), 558-565. doi: 10.1080/09540120412331319750

Remien, R. H., Hirky, A. E., Johnson, M. O., Weinhardt, L. S., Whittier, D., & Le, G. M. (2003). Adherence to medication treatment: A qualitative study of facilitators and barriers among a diverse sample of HIV+ men and women in four U.S. cities. *AIDS and Behavior, 7*(1), 61-72. doi:10.1023/A:1022513507669

Reust, C. E. (2011). Common adverse effects of antiretroviral therapy for HIV disease. *American Family Physician, 83*(12), 1443-1451. Retrieved from https://www.clinicalkey.com/service/content/pdf/watermarked/1-s2.0-S0002838X11602025.pdf?locale=en_US

Robinson, K. T., Sanders, S. A., & Boyd, J. L. (2012). High-risk HIV minorities in the United States: Who gets tested and where? *American Journal of Health Behavior, 36*(3), 348-359. doi:10.5993/AJHB.36.3.6

Rogers, C. R. (1959). A theory of therapy, personality, and interpersonal relationships as developed in the client-centered framework. In S. Koch (Ed.), *Psychology: A Study of a Science* (Vol. 3, pp.184-256). New York: McGraw-Hill.

Rollnick, S., & Miller, W. R. (1995). What is motivational interviewing? *Behavioural and Cognitive Psychotherapy, 23*(4), 325-334. doi: 10.1017/S135246580001643X

Rose, J. S., Sullivan, L. T., Hairston, T., Laux, J. M., & Pawelczak, M. (2015). HIV/AIDS knowledge among professional counselors and counseling students in Ohio. *Journal of LGBT Issues in Counseling, 9*(1), 2-16. doi:10.1080/15538605.2014.997333

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68-78.

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour

   change and its maintenance: Interventions based on self-determination theory. *The*

   European Health Psychologist, *10*, 2-5.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in*

   motivation, development, and wellness (2017). Beaverton: Ringgold Inc.

Salvo, M. C., & Cannon-Breland, M. L. (2015). Motivational interviewing for medication

   adherence. *Journal of the American Pharmacists Association: JAPhA, 55*(4), e354-e363.

   doi: 10.1331/JAPhA.2015.15532

Safren, S. A., Otto, M. W., Worth, J. L., Salomon, E., Johnson, W., Mayer, K., & Boswell, S.

   (2001). Two strategies to increase adherence to HIV antiretroviral medication: Life-steps

   and medication monitoring. *Behaviour Research and Therapy, 39*(10), 1151-1162. doi:

   10.1016/S0005-7967(00)00091-7

Sankar, A., Neufeld, S., Berry, R., & Luborsky, M. (2011). Cultural rationales guiding

   medication adherence among African American with HIV/AIDS. *AIDS Patient Care and*

   STDs, *25*(9), 547-555. doi:10.1089/apc.2010.0345

Santos, C. C., Loschi, R. H., & Arellano-Valle, R. B. (2013). Parameter interpretation in skewed

   logistic regression with random intercept. *Bayesian Analysis, 8*(2), 381-410. 10.1214/13-

   BA813

Schoo, A. M., Lawn, S., Rudnik, E., & Litt, J. C. (2015). Teaching health science students

   foundation motivational interviewing skills: Use of motivational interviewing treatment

   integrity and self-reflection to approach transformative learning. *BMC Medical*

   Education, 15(1), 228. 10.1186/s12909-015-0512-1

Sebire, S. J., Standage, M., & Vansteenkiste, M. (2009). Examining intrinsic versus extrinsic exercise goals: Cognitive, affective, and behavioral outcomes. *Journal of Sport & Exercise Psychology, 31*(2), 189-210. doi: 10.1123/jsep.31.2.189

Sheldon, K. M., Arndt, J., & Houser-Marko, L. (2003a). In search of the organismic valuing process: The human tendency to move towards beneficial goal choices. *Journal of Personality, 71*(5), 835-869. doi: 10.1111/1467-6494.7105006

Sheldon, K. M., Williams, G., & Joiner, T., Jr. (2003b). *Self-determination theory in the clinic: Motivating physical and mental health*. New Haven: Yale University Press.

Shultz, K. S., Hoffman, C. C., & Reiter-Palmon, R. (2005). Using archival data for I-O research: Advantages, pitfalls, sources, and examples. *The Industrial-Organizational Psychologist, 42*(3), 31-37. Retrieved from

http://www.psychology.csusb.edu/facultyStaff/docs/Shultz_et_al_2005_TIP.pdf

Sikkema, K. J., & Kelly, J. A. (1996). Behavioral medicine interventions can improve the quality-of-life and health of persons with HIV disease. *Annals of Behavioral Medicine, 18*(1), 40-48. doi: 10.1007/BF02903938

Skinner, B. F. (1974). *About behaviorism*. New York: Knopf.

Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review, 30*(1), 74-99. doi: 10.1016/j.dr.2009.11.001

Substance Abuse and Mental Health Services Administration. (2017). Data Collection Methods: Pros and Cons [webpage]. Retrieved from https://www.samhsa.gov/capt/tools-learning-resources/data-collection-methods-pros-cons

Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (6th ed.). Boston: Pearson.

Tahan, H. A., & Sminkey, P. V. (2012). Motivational interviewing: Building rapport with clients to encourage desirable behavioral and lifestyle changes. *Professional Case Management, 17*(4), 164-172. doi: 10.1097/NCM.0b013e318253f029

Thames, A. D., Moizel, J., Panos, S. E., Patel, S. M., Byrd, D. A., Myers, H. F.,… Hinkin, C. H. (2012). Differential predictors of medication adherence in HIV: Findings from a sample of African American and Caucasian HIV-positive drug-using adults. *AIDS Patient Care and STDs*, *26*(10), 621-630. doi: 10.1089/apc.2012.0157

Thrasher, A. D., Golin, C. E., Earp, J. A. L., Tien, H., Porter, C., & Howie, L. (2006). Motivational interviewing to support antiretroviral therapy adherence: The role of quality counseling. *Patient Education and Counseling, 62*(1), 64-71. doi: 10.1016/j.pec.2005.06.003

Treasure, J. (2004). Motivational interviewing. *Advances in Psychiatric Treatment, 10*(5), 331-337. doi: 10.1192/apt.10.5.331

United Nations International Children's Emergency Fund (2016, December). *Current status and progress* [webpage]. Retrieved from https://data.unicef.org/topic/hivaids/adolescents-young-people/

U.S. Department of Housing and Urban Development (n.d.). *Housing opportunities for persons with AIDS* [webpage]. Retrieved from https://www.hudexchange.info/programs/hopwa/

U.S. Department of Veterans Affairs (2016, August 10). *Treatment decisions for HIV: Entire section* [webpage]. Retrieved from https://www.hiv.va.gov/patient/treat/decisions-single-page.asp

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F.
(1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation
in education. *Educational and Psychological Measurement, 52*(4), 1003-1017. doi:
10.1177/0013164492052004025

Vallerand, R. J., Pelletier, L. G., & Koestner, R. (2008). Reflections on self-determination
theory. *Canadian Psychology/Psychologie Canadienne, 49*(3), 257-262. doi:
10.1037/a0012804

Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in
self-determination theory: Another look at the quality of academic motivation.
Educational Psychologist, 41(1), 19-31. doi: 10.1207/s15326985ep4101_4

Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). The development of the five mini-
theories of self-determination theory: An historical overview, emerging trends, and future
directions. In T. C. Urdan & S. A. Karabenick (Eds.), *Advances in motivation and
achievement, v. 16A – The decade ahead: Theoretical perspectives on motivation and
achievement* (pp. 105-165). London, England: Emerald Group Publishing Limited.

Vansteenkiste, M., & Sheldon, K. M. (2006). There's nothing more practical than a good theory:
Integrating motivational interviewing and self-determination theory. *The British Journal
of Clinical Psychology/the British Psychological Society, 45*(Pt 1), 63-82. doi:
10.1348/014466505X34192

Vansteenkiste, M., Ryan, R. M. (2013). On psychological growth and vulnerability: Basic
psychological need satisfaction and need frustration as a unifying principle. *Journal of
Psychotherapy Integration, 23*(3), 263-280. doi: 10.1037/a0032359

Vansteenkiste, M., Williams, G. C., & Resnicow, K. (2012). Toward systematic integration between self-determination theory and motivational interviewing as examples of top-down and bottom-up intervention development: Autonomy or volition as a fundamental theoretical principle. *The International Journal of Behavioral Nutrition and Physical Activity, 9*(1), 23-23. doi: 10.1186/1479-5868-9-23

Vajpayee, M., & Mohan, T. (2011). Current practices in laboratory monitoring of HIV infection. *The Indian Journal of Medical Research, 134*(6), 801-822. doi: 10.4103/0971-5916.92627

Visser, C. (2010). Self-determination theory meets solution-focused change: Autonomy, competence and relatedness support in action. *InterAction, 2*(1), 7-26. Retrieved from http://www.ingentaconnect.com/content/sfct/inter/2010/00000002/00000001/art00002

Wagner, C. C., & Ingersoll, K. S. (2012). *Motivational interviewing in groups*. New York: Guilford Press.

Wawrzyniak, A. J., Rodríguez, A. E., Falcon, A. E., Chakrabarti, A., Parra, A., Park, J., . . . Metsch, L. R. (2015). Association of individual and systemic barriers to optimal medical care in people living with HIV/AIDS in Miami-Dade County. *JAIDS Journal of Acquired Immune Deficiency* Syndromes*, 69 Suppl 1*, S63-S72. 10.1097/QAI.0000000000000572

Whetten, K., Reif, S. S., Napravnik, S., Swartz, M. S., Thielman, N. M., Eron Jr, J. J.,… Soto, T. (2005). Substance abuse and symptoms of mental illness among HIV-positive persons in the southeast. *Southern Medical Journal*, *98*(1), 9-14. doi: 10.1097/01.SMJ.0000149371.37294.66

Whetten, K., Reif, S., Whetten, R., & Murphy-McMillan, L. K. (2008). Trauma, mental health, distrust, and stigma among HIV-positive persons: Implications for effective care. *Psychosomatic Medicine*, *70*(5), 531-538. doi: 10.1097/PSY.0b013e31817749dc

Wichmann, S. S. (2011). Self-determination theory: The importance of autonomy to well-being across cultures. *The Journal of Humanistic Counseling, 50*(1), 16-26. doi: 10.1002/j.2161-1939.2011.tb00103.x

Williams, G. C., Rodin, G. C., Ryan, R. M., Grolnick, W. S., & Deci, E. L. (1998). Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychology, 17*(3), 269-276. doi: 10.1037/0278-6133.17.3.269

Wilson, P. A., Nanin, J., Amesty, S., Wallace, S., Cherenack, E. M., & Fullilove, R. (2014). Using syndemic theory to understand vulnerability to HIV infection among Black and Latino men in New York City. *Journal of Urban Health*, *91*(5), 983-998. doi:10.1007/s11524-014-9895-2

Witte, R. S., & Witte, J. S. (1997). *Statistics*. New York, NY: Harcourt Brace College Publishers.

World Health Organization. (2013, June). *Definition of key terms* [webpage]. Retrieved from http://www.who.int/hiv/pub/guidelines/arv2013/intro/keyterms/en/

World Health Organization. (2016a). *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: Recommendations for a public health approach* (2nd ed.). Geneva: World Health Organization.

World Health Organization. (2016b). *Number of women aged 15 and over living with HIV in 2014* [online interactive graph]. Retrieved from http://gamapserver.who.int/gho/interactive_charts/hiv/women/atlas.html

World Health Organization. (2017, November). *HIV/AIDS fact sheet* [webpage]. Retrieved from

    http://www.who.int/mediacentre/factsheets/fs360/en/

World Health Organization, & Oatway. J. (2009). *10 facts on HIV/AIDS* [webpage]. Retrieved

    from http://www.who.int/features/factfiles/hiv/facts/en/index3.html

World Health Organization, Centers for Disease Control and Prevention, Joint United Nations

    Programme on HIV/AIDS [UNAIDS], & FHI 360. (2017). *Biobehavioral survey*

    guidelines for populations at risk for HIV [PDF file]. Retrieved from

    http://apps.who.int/iris/bitstream/handle/10665/258924/9789241513012-

    eng.pdf;jsessionid=C11918CAA86682FEC771DFB501926513?sequence=1

Yu, T., & Wu, L. (2017). Robust modelling of the relationship between CD4 and viral load for

    complex AIDS data. *Journal of Applied Statistics, 45*(2), 367-17. doi:

    10.1080/02664763.2017.1279594

Zeligman, M., & Robinson, E. H., III. (2014). Counselors' role in HIV medication adherence: A

    motivational interviewing perspective. *Journal of Creativity in Mental Health, 9*(2), 232-

    244. doi: 10.1080/15401383.2014.895471

Zhao, L., Chen, Y., & Schaffner, D. W. (2001). Comparison of logistic regression and linear

    regression in modeling percentage data. *Applied and Environmental Microbiology*, *67*(5),

    2129-2135. 10.1128/AEM.67.5.2129-2135.2001

APPENDIX A: Ryan White Part D Supplemental Grant – Project CARE

RWPD Supplemental Grant 2014 - 2015
Project Title: FY 2014 PART D SUPPLEMENTAL FUNDING OPPORTUNITY
Applicant Name: East Carolina University, 2200 South Charles Blvd, Greenville Ctr Rm 2906
Greenville, NC 27858, Phone: 252-328-9549
E-mail Address: osp@ecu.edu, keyesa@ecu.edu and faduln@ecu.edu
Web Site Address: http://www.ecu.edu/cs-dhs/internalmed/Infectious-Disease.cfm

Project CARE: Creative Approach to Retention and Engagement for women and young men
Intervention**:** Motivational Interviewing Training of Staff
Request: $65,280

Introduction
East Carolina University-Brody School of Medicine HIV Program (ECU-BSOMHIVP) proposes to use supplemental Ryan White part D (RWPD) funding to train staff involved in treatment adherence in motivational interviewing technique (MIT) to promote treatment adherence. Fifteen staff members will be trained to include: medical care coordinators; medication adherence clinical pharmacist; substance use/mental health counselor; and some nurses and medical care providers. The target population will be women (in particular Black/African American women who represent 80% of our female population) and young men >18 to <25 years of age receiving primary HIV medical care at BSOMHIVP. The primary goal of the intervention is to increase our staff ability to use an evidence-based communication approach to identify barrier to retention and what will motivate clients towards retention in care.

The MI training will be done at the BSOMHIV clinic and facilitated by staff from ECU Department of Additions and Rehabilitation Studies certified in MI technique training. This project will train existing personnel to integrate MI into their communication with clients on an everyday basis. The staff will use MI to promote retention by helping clients to keep two-provider appointments/CD4/VL twice in a 12 month monitored period, to take their medication as prescribed and substance use reduction or abstinence. Promoting retention in care is one of the National HIV/AIDS Strategies to Increasing Access to Care and Improving Health Outcomes for people living with HIV: By 2015, increase the proportion of Ryan White HIV/AIDS Program clients who are in continuous care (at least 2 visits for routine HIV medical care in 12 months at least 3 months apart) from 73 percent to 80 percent (1). Our quality management data indicates that our WICY clients are not meeting this national standard. MI training will help our staff to gain the ability to use open ended questions and listening skills to identify barriers to retention in care and to help identify what will motivate clients to set treatment adherence goals and medication adherence.

II. Needs Assessment
Description of Burden
The ECU-BSOMHIVP is located in Greenville, NC, which is approximately 90 miles east from Raleigh, NC and 100 miles west of the Outer Banks, NC. This includes a 30-county catchment area of eastern North Carolina (ENC), which is predominantly rural, with limited to no public transportation, and 12% to 33% of residents live at or below poverty level (2). BSOMHIVP provides comprehensive primary HIV medical care to the predominately rural area of eastern North Carolina (ENC).   BSOMHIVP is a 'One Stop' clinic that provides several core and support services: primary HIV medical care, substance use and

mental health counseling, medical care coordination/medical case management; medication adherence clinical pharmacist counseling; gynecology care for all non-pregnant women; peer- led prevention for positives support groups; RW transportation assistance and 340b prescription assistance program. MI training will be integrated within the existing infrastructure of the BSOMHIVP and is an efficient use of resources.

In 2013 BSOMHIVP provided care for 1,455 unduplicated HIV positive people living with HIV (PLWH) disease. Our quality management data for WICY clients in calendar years 2012 and 2013 identified gaps in retention in care: In 2012, 44% and in 2013, 52% of women had one medical visit in each 6-month period (at least 60 days apart) of the 24 months monitored period and young men (>18 - < 25 years) over the same period it was 16% and 35% respectfully. Other retention in care gaps include: for women 63% (2012) and 72% (2013) had two CD4/VL labs 90 days apart; and for men 50% and 60% (respectfully). Some of our client's demographic include: 77% (n = 1,119) were Black/African American, 4% (n = 56 were Hispanic; 64% (n = 932) were male and 36% (n = 519) were women (80% Black/African American); 66% (n = 977) live at or below 100% Federal Poverty Level (FDL) and 21% (n= 311) between 100% and 200% of FDL; 55% (n = 805) had Medicaid or Medicare, 17% (n = 142) had other private insurance, 41% (n=595) were uninsured and 35% (n=514) received AIDS drug assistance program (2013 BSOMHIVP RSR). The table below provided data on our program specific to WICY clients from January 1, 2012 to December 31, 2013

ECU-BSOMHIVP HIV Care Continuum Data – January 1, 2012 to December 31, 2013

Stages	Measurement Periods			
	Calendar Year 2012		**Calendar Year 2013**	
Number of HIV infected WICY persons in care [1]	551	97.70 % In care	573	97.12 % in care
	564		590	
Number of WICY newly diagnosed with HIV [2]	37	6.56% Newly Dx.	39	6.6% Newly Dx.
	564		590	
Number of WICY linked to HIV care within 90 days of diagnosis **TOTAL** [3]	35	**Linked to care**	35	**Linked to care**
	37	94.59%	39	89.74%
Number of WICY linked to HIV care within 90 days of diagnosis - **WOMEN** [3.1]	24		17	
	25	96.00%	19	89.47%
Number of WICY linked to HIV care within 90 days of diagnosis **MEN 18-24** [3.2]	11		18	
	12	91.67%	20	90.00%
Number of WICY retained in care **TOTAL** [4]	169	**Retained in Care**	236	**Retained in Care**
	407	41.52%	451	52.33%
Number of WICY retained in care **WOMEN** [4.1]	162		209	
	369	43.90%	405	51.60%

Number of WICY retained in care **Men 18-24**[4.2]	6		16	
	38	15.79%	46	34.78%
Number of WICY prescribed antiretroviral therapy **TOTAl:**[5]	515	**WICY on ART**	541	**Prescribed ART**
	551	93.47%	573	94.42%
Number of WICY prescribed antiretroviral therapy **WOMEN**[5.1]	456		475	
	483	94.41%	501	94.81%
Number of WICY prescribed antiretroviral therapy **MEN 18-24**[5.2]	47		53	
	68	69.12%	72	73.61%
Number of WICY with virologic suppression Total[6]	**392**	**Virally Suppressed**	**447**	**Virally Suppressed**
	551	**71.14%**	**573**	**78.01%**
Number of WICY with virologic suppression **WOMEN**[6.1]	354		402	
	483	73.29%	501	80.24%
Number of WICY with virologic suppression **Men 18-24**[6.2]	38		34	
	68	55.88%	72	47.22%
Number of WICY who received 2 CD4 labs 90 days apart in measurement year TOTAL [7]	**320**	**2 CD 4 Labs 90 Days Apart**	**376**	**2 CD 4 Labs 90 Days Apart**
	505	**63.37%**	**522**	**72.03%**
Number of WICY who received 2 CD4 labs 90 days apart in measurement year **WOMEN** [7.1]	286		341	
	450	63.56%	522	65.33%
Number of WICY who received 2 CD4 labs 90 days apart in measurement year **Men 18-24** [7.2]	28		28	
	55	50.91%	47	59.57%
Number of WICY who received 2 VL labs 90 days apart in measurement year TOTAL [8]	**319**	**2 Viral Load Labs 90 Days Apart**	**373**	**2 Viral Load Labs 90 Days Apart**
	505	**63.17%**	**522**	**71.46%**
Number of WICY who received 2 VL labs 90 days apart in measurement year **WOMEN** [8.1]	286		338	
	450	63.56%	475	71.16%
Number of WICY who received 2 VL labs 90 days apart in measurement year **Men 18-24** [8.2]	27		35	
	55	49.09%	47	74.47%

1. Numerator - Total number of WICY Infected with HIV and in care during the measurement year.
Denominator - Total number of WICY with an HIV diagnosis during measurement year

2. Numerator - Total number of WICY newly diagnosed with HIV during measurement year 2012 Denominator - Total number of WICY with a HIV diagnosis during measurement year
3. Numerator - Total number of HIV infected WICY in care during measurement year Denominator - Total number of WICY newly diagnosed with HIV during measurement year
3.1 Numerator - Total number of HIV infected Women in care during measurement year Denominator - Total number of Women newly diagnosed with HIV during measurement year
3.2 Numerator - Total number of HIV infected Men 18-24 in care during measurement year Denominator - Total number of Men 18-24 newly diagnosed with HIV during measurement year
4. Numerator - Number of WICY patients in the denominator who had at least one medical visit in each 6-month period of the 24-month measurement period with a minimum of 60 days between first medical visit in the prior 6-month period and the last medical visit in the subsequent 6-month period Denominator - Total number of WICY, regardless of age, with a diagnosis of HIV with at least one medical visit in the first 6 months of the 24-month measurement period
4.1 Numerator - Number of Female patients in the denominator who had at least one medical visit in each 6-month period of the 24-month measurement period with a minimum of 60 days between first medical visit in the prior 6-month period and the last medical visit in the subsequent 6-month period Denominator - Total number of Females regardless of age, with a diagnosis of HIV with at least one medical visit in the first 6 months of the 24-month measurement period
4.2 Numerator - Number of Men 18-24 in the denominator who had at least one medical visit in each 6-month period of the 24-month measurement period with a minimum of 60 days between first medical visit in the prior 6-month period and the last medical visit in the subsequent 6-month period Denominator - Total number of Men 18-24, with a diagnosis of HIV with at least one medical visit in the first 6 months of the 24-month measurement period
5. Numerator - Number of WICY patients from the denominator with an HIV diagnosis and prescribed ART in the 12 month measurement period Denominator - Total Number of WICY patients with an HIV diagnosis with at least one O/A visit in the 12 month measurement period.
5.1 Numerator - Number of Female patients from the denominator with an HIV diagnosis and prescribed ART in the 12 month measurement period Denominator - Total Number of Female patients with an HIV diagnosis with at least one O/A visit in the 12 month measurement period.
5.2 Numerator - Number of Men 18-24 from the denominator with an HIV diagnosis and prescribed ART in the 12 month measurement period Denominator - Total Number of Men 18-24 with an HIV diagnosis with at least one O/A visit in the 12 month measurement period.
6. Numerator - Number of WICY in the denominator with and HIV diagnosis with a viral load <200 copies/mL at last test in the 12 month measurement period Denominator - Total Number of WICY patients with an HIV diagnosis with at least one O/A visit in the 12 month measurement period.
6.1 Numerator - Number of Females in the denominator with and HIV diagnosis with a viral load <200 copies/mL at last test in the 12 month measurement period Denominator - Total Number of Female patients with an HIV diagnosis with at least one O/A visit in the 12 month measurement period.
6.2 Numerator - Number of Men 18-24 in the denominator with and HIV diagnosis with a viral load <200 copies/mL at last test in the 12 month measurement period Denominator - Total Number of Men 18-24 with an HIV diagnosis with at least one O/A visit in the 12 month measurement period.
7. Numerator - Total Number of WICY who had at least 2 CD 4 Labs at least 3 months Apart Denominator - Total number of HIV Infected WICY who had at least one medical visit during the measurement year

7.1 Numerator - Total Number of Women who had at least 2 CD 4 Labs at least 3 months Apart Denominator - Total number of HIV Infected Women who had at least one medical visit during the measurement year
7.2 Numerator - Total Number of Men 18-24 who had at least 2 CD 4 Labs at least 3 months Apart Denominator - Total number of HIV Infected Men 18-24 who had at least one medical visit during the measurement year
8. Numerator - Total Number of WICY who had at least 2 Viral Load Labs at least 3 months Apart Denominator - Total number of HIV Infected WICY who had at least one medical visit during the measurement year
8.1 Numerator - Total Number of Women who had at least 2 Viral Load Labs at least 3 months Apart Denominator - Total number of HIV Infected Women who had at least one medical visit during the measurement year
8.2 Numerator - Total Number of Men 18-24 who had at least 2 Viral Load Labs at least 3 months Apart Denominator - Total number of HIV Infected Men 18-24 who had at least one medical visit during the measurement year

Advances in the HIV treatment over the past decade have led to improved outcomes and longer, higher quality of life for PLWH. This has been accomplished, in part, due to the Ryan White Care Act, which provides primary HIV medical care and support services. Given the chronicity of successful HIV care, successful interventions will need to provide sustainable improvement in linkage and retention and must address the range of barriers faced by people living with HIV/AIDS, especially among harder to reach populations like women, communities of color and young MSM. Some of these barriers include competing needs, poverty, decreased educational achievement, gender imbalance, stigma, mental illness and substance use, among other factors. These barriers and others (joblessness, homelessness, denial, racism, discrimination, disclosure and confidentiality concerns and religious/cultural beliefs (alternative medicines and prayer) have been shown to be competing concerns to health care (3, 4).

The interplay between these barriers makes for a complex matrix that contributes to the vulnerability of women and young men living with HIV disease.   These barriers also interfere with timely entry into primary HIV medical care after diagnosis and the subsequent retention of clients in care and remain significant challenges. Previous evaluations of interventions aimed at addressing these barriers, in particular those outlined in the HRSA publication "Making the Connection: Promoting engagement and retention in HIV medical care among hard-to-reach populations," have been encouraging. The programs described in the publication targeted a wide range of populations and used a variety of interventions aimed at engaging and retaining harder to reach populations. These programs also highlighted the creative use of existing personnel and highlighted the need to seamlessly insert new interventions within the framework of existing operations and the importance of ongoing quality assurance measures to provide periodic improvements to the intervention (5).

Proposed Intervention:
Motivational interviewing (MI) is a client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence. Providers trained in MI use a specific approach in conversation with clients to help them develop the motivation to initiate and sustain behavioral change. MI was first developed in connection with substance use treatment and is now used in a range of behavioral health applications (smoking cessation, medication adherence, and weight management). Research has shown that MI can produce significant change in client health behavior in general (6). In

HIV care, MI can be used to address risk behaviors to help people better manage their HIV and improve health outcomes. MI has been used in a variety of Health Resources and Services Administration, HIV/AIDS Bureau (HAB), Special Projects of National Significance (SPNS) demonstration projects (6). At BSOMHIVP clinic, MI will be used to foster retention in care, medication adherence, and subsequently VL suppression.

Training ECU-BSOMHIVP staff in MI will provide the staff with an evidence-based tool to identify barriers to treatment adherence and to help motivate clients to choose behaviors that support retention in care. This new intervention will train staff in the use of open-ended questions and listening skls. We intend to train a variety of our team members who are involved in different aspect of treatment adherence (medical care coordinators, medication adherence clinical pharmacist, substance use-mental health counselor, nurses and medical provider). The cross-sectional staff will use MI to promote client center goals related to the provider's sub-specialty and within our multidisciplinary group settings. The medical care coordinators will use MI training to communicate with clients with open-ended questions and listening skills to identify client's barriers and what will motivate client to address barriers identified. The medication adherence clinical pharmacist will use MI to identify barriers to medication adherence. The substance use-mental health counselor can use MI to motivate client towards realistic achievable goal of substance use reduction or abstinent. Nurse and providers can use MI to identify barriers to treatment adherence and the need for referring clients to one of our support providers: medical case manager, medication adherence clinical pharmacist, and substance use-mental health counselor. Each team member interacts with our clients and has unique opportunity to gather information from the client about their barriers to treatment adherence and what may motivate a client towards treatment adherence. Clients information collected form many providers will be shared at one of our two multidisciplinary meeting: Monday Morning Case Conference where clients' treatment plans are reviewed and all new/re-engaging clients for that week are discussed; and Monthly Treatment Adherence Team (TAT) meeting where client's with complex issues are discuss and individualized treatment care plans are developed.

MI training is aimed at improving our staff competency in the use of MI to gather information from clients and motivate clients to set goals to be compliant with provider visit and getting CD4 and VL studies done twice a year which will promote retention in care. Our intervention approach has the following primary objectives:

- 90% of the staff identified for the training will complete the beginning intense training and participate in the 'Learning Community' phase of the program to enhance participants' skill level to that of 'Competency'.

- Increase the percent of women and young men (>18 - <25 years) with one medical visit in each 6-month period (at least 60 days apart) of the 24 months monitored period to 65% for women from 52% and 50% for young men from 35%

- Increase the percent of WICY that have two CD4/VL 90 days apart in 12 month monitor period: women to 80% from 75% and young men (>18 - <25 years) to 70% from 60%.

Target Population:

The target population include women (in particular Black/ African American women who represent 80% of our female population) 18 years and older and young men > 18 years and < 25 year of age. All clients will participate in the intervention but data on the target population will be collected and reported separately.

III. Methodology

Project CARE will be a clinic-based initiative that will train staff at ECU-SOMHIVP to use MI to help motivate clients to be treatment adherent. The medical care coordinators will serve as the main contact for clients and will follow clients for the duration of the intervention. Other staff that is involved in treatment adherence will also be trained to include: medication adherence clinical pharmacist who is directly involved in medication adherence; substance use/mental health counselor; and some nurses and medical care providers.

Motivational Interviewing training will be offered by a team trained in MI at Department of Addictions and Rehabilitation Studies at East Carolina University (ECU). Dr. William 'Leigh' Atherton is an Assistant Clinical professor, Director of the Navigate Counseling clinic and Field Site Coordinator for MS Programs at ECU's Department of Addiction and Rehabilitation Studies. He has over 10 years of clinical experience in the mental health substance use field. He has been a member of the Motivational Interviewing Network of Trainers (MINT) since 2008 and has conducted over 2500 hours in MI training. Dr. Paul Toriello is an Associate Clinical Professor at Department of Addictions and Rehabilitation Studies at ECU. He has been a MIT trainer since 1995 to include advanced MI trainer, trainer of MI integrity coding system and did the MI advanced training curriculum. A doctoral candidate, to be announced, will also work on the program to assist Drs. Atherton and Toriello with the implementation of the program over the grant year.

The MI training will be provided over one year to include an intense introduction to MIT and the development of Learning Community groups. The intense introduction phase aims to enhance participants' initial skill level to that of 'Beginning Proficiency'. The Learning Community groups will engage participants in follow-up continuous learning, focused skill building sessions and coaching facilitated by MIT experts. The aim of the 'Learning Community' phase is to enhance participants' skill level to that of 'Competency'. The facilitators will use the learning-to-learn model in which the emphasis is on the spirit of MI to reflect understanding and practice of the MI approach. It is the goal that participants in the MI training will be able to identify client's responses that indicate a good response to MI and not-so-good responses. Research have identified that MI is an evidence-supported clinical method to promote behavioral change to support health care, that it can be disseminated in to practice, and feedback and/or coaching improves MI retention and proficiency after an intense clinical workshop introduction (9). The outline of the proposed training includes:

Training Objectives:

1. Understand Spirit and Principles of MI

2. Develop skill and comfort with Reflective Listening

3. Exchange information and advice provision within a MI style

4. Recognize, evoke, and respond to change and sustain talk language

5. Develop hope and confidence using MI

6. Strengthen commitment to change

7. Negotiate effective change plans

8. Integrate MI with other intervention strategies

Training Curriculum:

I. Introduction (*1 full day training*)

    a. MI Primer

    b. Individualized MI Training goal development

    c. Introduce MI interventions for specific target behaviors

        i. HIV Testing and Linkage to Care

        ii. Engagement and Retention in Care

        iii. Adherence to Antiretroviral Therapy

II. Motivational Interviewing Knowledge (*two 4-hour trainings*)

    a. Spirit & Principles

    b. Styles of communication

    c. Introduction to Motivational Interviewing Treatment Integrity (MITI) coding system

III. Learning Community (*multiple 4-hour skill building and coaching sessions*)

    a. Engaging:

        i. Opening Strategies & Rolling with Resistance

        ii. Coaching and Coding

    b. Focusing and Evoking

        i. Elicit and Respond to Change Talk

        ii. Coaching and Coding

    c. Planning and Integration

        i. Change Plan

IV. Internal Champion Coaching (*bi-weekly 1-hour advanced coaching/train-the-trainer session*

    a. Train-the-Trainer skill building

i. Training, coaching, and coding MI

b. Development of a sustainable training/coaching plan

ECU Motivational Interviewing Training Time line

	Aug 2014	Sept 2014	Oct 2014	Nov 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015
Coordinating Program Implementation	X										
Introduction Training session		X									
MI Knowledge Training session			X		X						
Learning Community Sessions					X	X	X	X	X	X	X
Identify two Champions*			X	X							
Intense Training of Champions					X	X	X	X	X	X	X
Retention QM data 2012-2013	X										
Retention QM data 2014-2015				X		X			X		X

*Champions will get intense MI training to be able provide MI support after the project ends

ECU Motivational Interviewing Training Work Plan

Proposed Intervention	Staff Responsible: (#, roles)	Target Population	Performance measures
Train staff in Motivational Intervening to enhance retention in care Adherence	N = 15: #8 medical care coordinators; #1 medication adherence clinical pharmacist #1 substance use/mental health counselor #2 nurses/nursing assistance #3 medical providers	All women living with HIV disease Young men >18 - <15 years of age living with HIV disease	• 90% of the staff identified for the training will complete the beginning intense training and participate in the 'Learning Community' phase of the program to enhance participants' skill level to that of 'Competency'. • Increase the percent of women and young men (>18 - <25 years) with one medical visit in each 6-month period (at least 60 days apart) of the 24 months monitored period to 65% for women from 52% and 50% for young men from 35% • Increase the percent of WICY that have two CD4/VL 90 days apart in 12 month monitor

			period: women to 80% from 75% and young men (>18 - <25 years) to 70% from 60%.

IV. Evaluation:

Evaluation is critical to determining programmatic success. We will measure the effectiveness of the staff to use MIT by qualitative and quantitative methods. Quantitative evaluation will include pre and post staff survey on knowledge of MI and chart review of clients that do not met HAB performance for provider visits, CD4/VL, and VL suppression. Data collected in RWY 2014-2015 on these performance indicators will be compared with 2012 and 2013 data. The qualitative measure will include observation of staff-client interviews and feedback from staff members trained in MI. Further, MI skill proficiency will be assessed through the use of the Motivational Interviewing Treatment Integrity (MITI) 3.0 coding system. Staff will submit audio recordings representing their use of MI, which will be coded by MI experts using the MITI coding system. MI proficiency standards range from 'Beginning Proficiency' to 'Competency'. MI experts will develop an initial individualized training plan with each staff, which will be continuously reviewed and updated based on the staff's level of progress with MI skills. The following table depicts the MITI 3.0 coding system and benchmarks.

Clinician Behavior Count/Summary-Score Thresholds	Beginning Proficiency	Competency
Global Clinician Ratings	Average of 3.5	Average of 4
Reflection to Questions Ratio	1:1	2:1
Percent Open Questions	50%	70%
Percent Complex Reflection	40%	50%
Percent MI-Adherent	90%	100%

The overall evaluation outcomes, lessons-learned, and recommended best-practices resulting from the program will be summarized and reported to the Ryan White project officer at regular intervals. Findings will be used to make policy recommendations to improve retention in care between women and young men, to reduce barriers that will allow clients to participate in long-term HIV treatment

Brief Biography of Motivational Interviewing Trainers

William "Leigh" Atherton, PhD, LPC, LCAS, CRC, CCS

Dr. Atherton currently holds the position of Clinical Assistant Professor, Director of Navigate Counseling Clinic, and Field Site Coordinator for MS programs within East Carolina University's Department of Addictions and Rehabilitation Studies. He has over 10 years of clinical experience in the mental health and substance use field, serving as a clinician, supervisor, and educator. He has been a member of the Motivational Interviewing Network of Trainers (MINT) since 2008, and has conducted over 2500 hours of training specific to Motivational Interviewing. His extensive experience with Motivational Interviewing (MI) includes:

- *Practicing and supervising MI since 2004,

- *Training in Advanced MI from William Miller, the co-creator of MI, and Theresa Moyers,

- *Training by Dr. Miller and Theresa Moyers as a MI Trainer,

- *Training in "MIA: STEP" (MIA:STEP is a MI clinical supervision curriculum),

- *Membership with the international Motivational Interviewing Network of Trainers since 2008

- *MI interventionist for NIDA R01 funded Project Safe through Boston Medical Center emergency department.

Paul Toriello, PhD, CRC, LCAS, CCS

Dr. Toriello **is** an Associate Professor in the Department of Rehabilitation Studies at East Carolina University (ECU). Before coming to ECU, Dr. Toriello served for several years as the Training Director and then the Clinical Director of a 108-bed residential facility serving adjudicated adolescents with behaviors disorders and substance use issues. His extensive experience with Motivational Interviewing (MI) includes:

- Practicing and supervising MI since 1995,

- Training in Advanced MI,

- Training as a MI Trainer,

- Training in the Motivational Interviewing Treatment Integrity coding system,

- Training as a "MIA:STEP Trainer (MIA:STEP is a MI clinical supervision curriculum), and

- Membership with the international Motivational Interviewing Network of Trainers since 2003.

For his MI research 2005, Dr. Toriello won an American Rehabilitation Counseling Association Research Award. He has conducted over 2000 clock hours of MI training with a broad spectrum of professionals. Finally, in the role of Principal Investigator or Research Consultant, Dr. Toriello has participated in grant projects funded by the National Institute on Drug Abuse, National Institute on Alcohol Abuse and Alcoholism, Center for Substance Abuse Treatment, and other national funding organizations.

Reference

1. National HIV/AIDS Strategy (NHAS

2. Epidemiologic Profile for HIVSTD Prevention & Care Planning, NC State Department of Health December, 2012, 2008.

3. Williams PB, Ekundayo O, et al. An Ethnically Sensitive and Gender-Specific HIV/AIDS Assessment of African American Women: A Comparative Study of Urban and Rural American Communities. Family Community Health 2003.Vol 26 (2); 108-123.

4. Whetten K, Reif S, et al. Gender Difference in Knowledge and Perceptions of HIV Resources Among Individuals Living with HIV in the Southeast; Southern Medical Journal 2004. Vol 97 (4): 342-349.

5. HRSA HIV/AIDS Bureau; Boston University School of Public Health, Health and Disability "Work Group; Making the Connection: Promoting engagement and retention in HIV medical care among hard-to-reach population; October 2006

6. HRSA HIV/AIDS Bureau Special Projects of National Significance; Creating Change: Using Motivational Interviewing in SPNS Projects; June 2010

7. Miller, WR, Yahne, CE., Moyer, TB et al; A Randomized Trial of Methods to Help Clinicians Learn Motivational Interviewing; Journal of Counseling and Clinical Psychology; 2004, Vol 72 (6)' 1050-1062.

APPENDIX B: Annual Risk Assessment Screening Tool

ANNUAL RISK ASSESSMENT SCREENING TOOL   Date: _____

Name: _____   MRN# _____

Gender: __Male __Female __Transgender   Race: B/W/H/O

Date of Birth: _____   Age: _____   Diagnosis: New/Out of Care/Never In Care/ Transfer

Ryan White/ ADAP Eligibility

☐ Complete	1. Insurance Type: _____
☐ Incomplete	2. Income (annual): None Pending Amount:_____
	3. HIV Primary Care: Public Funded Clinic Other
	4. Housing: Stable Unstable Unknown

HEALTH EDUCATION

I. Literacy

1. What is the highest level of education you achieved? _____

On a scale of 1 to 5, 5 being very well, how well do you: *Score:*

    Read: 1   2   3   4   5

    Write: 1   2   3   4   5

*If client scores 6 and below please use REALM-SF words to determine what words they have difficulty with.

Identify difficult words:

    Menopause, antibiotics, exercise, jaundice rectal, anemia, behavior

Score- (0 marked: high school reading level should understand materials); (1-3 marked: 7th to 8th grade reading may struggle); (4-6 marked: 4th to 6th grade reading will not understand prescriptions); (7 marked: will need audio and visual aids to understand.)

II. Basic Disease Knowledge

1. What is HIV?   Correct Answer   Incorrect Answer

2. What is AIDS?   Correct Answer   Incorrect Answer

3. What fluids can transmit HIV?   Blood   Semen/ Pre-Cum   Vaginal Fluids   Breast Milk

4. How is HIV passed?   Unprotected Sex   Sharing Needles   Mother to child

    (Oral, Anal, Vaginal)   (IDU, Tattoos etc...)   (Breastfeeding/Delivery/During)

5. What is a CD4 count & the target number?   Correct   Incorrect

    (Healthy cells that fight infection/ 500)

6. What is a viral load (VL) & the target number?   Correct   Incorrect

    (The level of virus in blood/ <20)

III. Sexual Risk

    1. Who do you prefer to have sex with? Males: _____ Females: _____ Both: _____

    2. Current Partner: Yes   No

MEDICAL CARE COORDINATION

IV. Intimate Partner Violence Screen (IPV)

1. Have you ever/ are currently been in a domestic violence situation?   Yes   No

	How often does your partner?....	Never/Rarely	Sometimes	Fairly	Often	Frequently
1	Physically hurt you					
2	Insult or talk down to you					
3	Threaten you with harm					
4	Scream or curse at you					
	TOTAL SCORING					

	Worchester County Universal Abuse & Domestic Violence Screening Tool	Yes	No	No Answer
		*Proceed only if patient marks at least **one** answer from #1-3*		
1	Do you ever feel afraid of your partner or someone in your life?			
2	Are you in a relationship with a person who physically hurts, threatens, neglects, or takes advantage/exploits you in any way (physically, sexually, financially, verbally, etc.)?			
3	Do you feel you are in danger?(physically or emotionally)			
4	Is it safe for you to go home?			
5	Has someone currently or ever pushed, grabbed, slapped, choked or kicked you?			
6	Forced you to have sex or made you do sexual things you were not comfortable with?			
7	Threatened to hurt you, your children, or someone close to you?			
	SCORING			
Was Child Protective Service or Adult Protective Services report completed?		**YES / NO**	Notes:	
Who was the agency of contact?		Notes:		
Please give date and type of follow-up provided:		Notes:		
Other details:		Notes:		

V. HIV Diagnosis History

1. Type of Diagnosis: (Circle one)   Newly Diagnosed   Previously Diagnosed
2. Date when were you tested and Where?   _____
3. Doctor/Provider & Clinic Name: _____
4. Last Doctor/Provider Appointment: _____
5. What HIV medications are you taking and/or prescribed?   _____

VI. Adherence

1. Past Medical Non- Adherence/ Non- Compliance   Yes   No
2. Has not had an appointment for >6 months):   Yes   No
3. Admits to lack of HIV medication adherence: Yes   No

2 | P a g e

VII. Barriers to Care

Behavioral	☐	Mental Health/ Psychological	☐	Legal/Court Involvement	☐	Spiritual	☐
Communication/ Language	☐	Employment	☐	Physical Needs	☐	Substance Abuse	☐
Cultural/Immigration	☐	Family	☐	Sexuality/Gender Issues	☐	Transportation	☐
Developmental/ Cognitive Disabilities	☐	Financial	☐	Pregnant and Parenting	☐	Safety/Crisis	☐
Education/Vocational	☐	Medical (Chronic/Other)	☐	Medication	☐	Housing	☐

MCC Management Level

A. *Extensive Care Coordination:* Need Referral for MCC Assessment if client has:
   a. New diagnosis of HIV
   b. History of being lost to care/Re-engaging in care or
   c. Homelessness
   d. Recently incarcerated or history of incarceration
   e. Pregnancy complicated by HIV infection
   f. CD4 count below 200
   g. Untreated mental illness and/or substance abuse
   h. History of non-adherence to HIV medication
   i. Illiterate or language barrier

B. *Problem Focused Care Coordination:* Need referral for appropriate service if client has:
   a. Transportation,
   b. Housing
   c. SA/MH

C. *Follow-Up:* Client has not identified barriers to care, but is in the process of clinic adjustment.

D. *No Care Coordination:* Client has not identified barrier to care; No referral

BEHAVIORAL HEALTH SERVICES

VIII. Mental Health Screen

1. Have you ever received or currently receiving mental health services?   ___Yes ___No
2. Have you ever been hospitalized for mental health reasons?   ___Yes ___No

    If yes, Please List_____

3. Are you currently taking or have you ever taken medications for mental health reasons? ___Yes ___No

    If yes, Please List_____

4. The thought of harming myself has occurred to me. ___Yes ___No   Past Attempt? ___Yes ___No
5. Trouble falling or staying asleep or sleeping too much.   ___Yes ___No
6. Not able to eat; poor appetite, not eating or overeating. ___Yes ___No

7. Over the **last 2 weeks**, how often have you been bothered by the following problems.

PHQ-4:   Scoring: 0= Not at all, 1= Several Days, 2= More than half the days, 3= Nearly every day
   A Feeling nervous, anxious, or on edge –
   A Not being able to stop or control worrying–
   D Little interest or pleasure in doing things–
   D Feeling down, depressed, or hopeless–

Total: /12 (Normal (0-2), Mild (3-5), Moderate (6-8), Severe (9-12) for:)

VIIII. Substance Abuse Screen

1. During the **past 12 months**…

	DAST-10	YES	NO
1	Used Drugs other than those required for medical reasons	1	0
2	Abuse more than one drug at a time	1	0
3	Always able to stop using drugs when you want to	1	0
4	Had blackouts, flashbacks as a result of drug use	1	0
5	Feel guilty about drug use	1	0
6	Family or friends complain about involvement with drugs	1	0
7	Neglected friends or family because of your drug use	1	0
8	Engaged in illegal activities in order to obtain drugs	1	0
9	Experienced withdrawal symptoms when stopped taking drugs	1	0
10	Had medical problems as a result of your drug use	1	0
	TOTAL SCORING	____/ **10**	
LOW = 0-2		**SUBSTANTIAL = 6-8**	
INTERMEDIATE = 3-5		**SEVERE = 9-10**	

Drug & Age of Onset: _____   Drug & Age of Onset: _____

Drug & Age of Onset: _____   Drug & Age of Onset: _____

X. Nicotine Screen (Fagerstrom Test)

1. Do you **currently** smoke/chew tobacco products? ___Yes ___No   Age of Onset: _____
2. **Past** smoking/chewing tobacco products? ___Yes ___No   How long abstinent? _____
3. Frequency

	FAGERSTROM	CHOICES		SCORE
1	How soon after you wake do you smoke your first cigarette?	Within 5 minutes 6-30 minutes 31-60 minutes After 60 minutes	3 2 1 0	
2	Do you find it difficult to refrain from smoking in places where it's forbidden? (e.g., church, library)	Yes No	1 0	
3	Which cigarette would you hate most to give up?	First one in the morning? All others	1 0	
4	How many cigarettes/day do you smoke?	10 or less 11-20 21-30 31-or more	0 1 2 3	
5	Do you smoke more frequently during the first hours after waking than during the rest of the day?	Yes No	1 0	
6	Do you smoke if you are so ill that you are in bed most of the day?	Yes No	1 0	
	TOTAL SCORING			____/ **10**
VERY LOW = 0-2		**HIGH= 6-7**		
LOW = 3-4		**VERY HIGH= 8-10**		
MEDIUM= 5				

4 | P a g e

APPENDIX C: University & Medical Center Institutional Review Board Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
www.ecu.edu/ORIC/irb

Notification of Initial Approval: Expedited

From:	Biomedical IRB
To:	Qunesha Hinton
CC:	
	Shari Sias
Date:	2/14/2018
Re:	UMCIRB 18-000028
	Biopsychosocial Barriers, Motivational Interviewing, and Medication Adherence in Persons Living with HIV and AIDS

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 2/13/2018 to 2/12/2019. The research study is eligible for review under expedited category #5. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Biopsychosocial Barriers, Motivational Interviewing, and Medication Adherence in Persons Living with HIV and AIDS	Study Protocol or Grant Application
Waiver of HIPAA Authorization_QHinton_Signed.pdf	HIPAA Authorization

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

QU'NESHA HINTON, PHD, NCC, LPCA, LCASA

qshinton@gmail.com

EDUCATION

East Carolina University (ECU)
Ph.D., Rehabilitation Counseling and Administration   *Expected May 2018*

M.S., Substance Abuse and Clinical Counseling   *August 2014*
Certificate in Rehabilitation Studies (CRC Eligible)

University of North Carolina at Chapel Hill
B.A., Psychology   *May 2012*
Anthropology minor

PROFESSIONAL LICENSURE & CERTIFICATIONS

National Certified Counselor (NCC #811372)   *February 2018*

North Carolina Board of Licensed Professional Counselors – Associate (LPCA #A11830) *September 2015*

North Carolina Licensed Clinical Addictions Specialist – Associate (LCASA #20587)   *September 2014*

PUBLICATIONS IN PRESS

Tate, T.T., **Hinton, Q.S.** (2016). Preparing service members for the civilian workforce: A test review of the Military-to-Career Transition Inventory (MCTI).

Hinton, Q.S., Goodwin Jr., L.R. (2016). Barriers to wellness for counseling students. *VISTAS Summer 2016*. Retrieved from http://www.counseling.org/knowledge-center/vistas

PRESENTATIONS AT PROFESSIONAL MEETINGS

Hinton, Q.S. (2017, April). *STIs 101*. Presentation at the local fourth annual Community Health Fair of Goldsboro High School, Goldsboro, North Carolina.

Meola, C., **Hinton, Q.S.** (*2017, March**). *Addressing Counselor Wellness through Equine Assisted Learning*. Poster session at the national conference of the American Counseling Association 2017 Conference and Expo, San Francisco, California. **Proposal accepted.*

Hinton, Q.S., Meola, C., Sias, S. (2016, July). *Unique Supervision Needs for Counselors Working with People Living with HIV/AIDS*. Poster session at the national conference of the 40th Anniversary American Mental Health Counselors Association Annual Conference, New Orleans, Louisiana.

Hinton, Q.S., Gilbert, G. D., Williams, P. (2016, April). *HIV and STDs 101*. Presentation at the local third annual Community Health Fair of Goldsboro High School, Goldsboro, North Carolina.

Hinton, Q.S., Sanders, M. (2016, April). *Effective Treatment for People Living with HIV/AIDS (PLWHA) and Co-Occurring Substance Use Disorders (SUDs) for Community Care Providers.* Presentation at the state conference of the University of North Carolina – Chapel Hill Horizons 2016 Annual Conference, Chapel Hill, North Carolina.

Sanders, M., **Hinton, Q.S.** (2016, April). *Using the BESI with clients from an economically depressed background.* Presentation at the state conference of the North Carolina Vocational Evaluation and Work Adjustment Association and North Carolina Vocational Evaluation and Career Assessment Professionals Training Conference, Atlantic Beach, North Carolina.

Atherton, W.L., **Hinton, Q.S.**, Meola, C. (2016, March). *Clinical Supervision: Fundamentals in addictions and rehabilitation counseling.* Presentation at the national conference of the Professional Association of Rehabilitation Counselors (PARC) 2016 Annual Conference, Atlantic Beach, North Carolina.

Hinton, Q.S. (2015, July). *Living with HIV/AIDS and co-occurring mental health and substance use disorders.* Presentation at the Safe Spaces Program, Greenville, North Carolina.

Hinton, Q.S., Montgomery-Lee, E. (2014, December). *Fetal alcohol spectrum disorders.* Presentation at the Pitt County Coalition on Substance Abuse Town Hall Meeting, Greenville, North Carolina.

Hinton, Q.S., Harris, J.D. (2014, April). *Co-occurring body dysmorphic disorder and substance use disorder: Considerations for racial and sexual minorities.* Poster session at the state conference of the 8th Annual Rehabilitation of Racial and Ethnic Minorities with Behavioral Addictions (REMBA) Conference, Greensboro, North Carolina.

Bell, A. M., **Hinton, Q.S.**, Gilbert, G. D. (2014, February). *Navigate – Pregnancy and Recovery Clinic: Using motivational interviewing in an integrated healthcare program.* Poster session at the state conference of the Jean Elaine Mills 10th Annual Health Symposium, Greenville, North Carolina.

Tate, T.T., **Hinton, Q.S.** (2013, October). *Preparing service members for the civilian workforce: A test review of the Military-to-Career Transition Inventory (MCTI).* Poster session at the state conference of the 1st Annual Military and Trauma Counseling Conference, Greenville, North Carolina.

Harris, J.D., **Hinton, Q.S.** (2013, September). *Fitness and recovery.* Poster at the Pitt County Coalition on Substance Abuse 4th Annual Walk for Recovery, Greenville, North Carolina.

CLINICAL EXPERIENCE

COUNSELING

ECU Navigate Counseling Clinic   Greenville, NC
Clinician – II & Clinic Coordinator   *August 2014 – December 2015, May 2017 – August 2017*
Clinician – I (*master's level practicum*)   *August 2013 – December 2013*

ECU Center for Counseling and Student Development   Greenville, NC
Brief Alcohol Screening and Intervention for College Students (BASICS) Counselor *September 2016 – April 2017*

ECU Beginnings – Pregnancy and Recovery Clinic (PARC)   Greenville, NC
Group Leader & Perinatal Educator   *August 2014 – July 2015, May 2016 – August 2016*
Group Co-leader (*master's level practicum/internship*)   *August 2013 – July 2014*

ECU Physicians – Division of Infectious Diseases and International Travel Health   Greenville, NC
Behavioral Health Specialist (*master's level internship*)   *January 2014 – July 2014*

ECU Career Center   Greenville, NC
Student Career Counselor   *January 2015 – April 2015, June 2013 – July 2013*

SUPERVISION

ECU Department of Addictions and Rehabilitation Studies (DARS)   Greenville, NC
Doctoral Supervisor   *August 2015 – August 2017*

TEACHING ACTIVITIES

Teaching Assistant   *Fall 2017*
ECU ADRE 2003 (undergraduate level) Alcohol and Drug Abuse: Health and Social Problems

Teaching Assistant   *Fall 2017*
ECU ADRE 4796 (undergraduate level) Contemporary Issues for Addictions

Teaching Assistant   *Fall 2017*
ECU ADRE 6796 (master's level) Contemporary Issues for Addictions

Guest Lecture, *Applications of the Barriers to Employment Success Inventory*   *April 2016*
ECU ADRE 6401 (master's level) Assessment in Clinical, Addictions, and Rehabilitation Counseling

Guest Lecture, *Finding Your Balance*   *July 2015*
ECU ADRE 6010 (master's level) Introduction to Clinical, Addictions, and Rehabilitation Counseling

Guest Lecture, *Ethical Issues in Community Work*   *June 2015*
ECU ADRE 6050 (master's level) Ethics and Legal Aspects in Clinical, Addictions, and Rehabilitation Counseling

Guest Lecture, *Values and the Helping Relationship*   *June 2015*
ECU ADRE 6050 (master's level) Ethics and Legal Aspects in Clinical, Addictions, and Rehabilitation Counseling

Guest Lecture, *Family Mapping*   *February 2015, October 2014*
ECU ADRE 6320 (master's level) Family Treatment in Substance Abuse Rehabilitation

Guest Lecture, *Beyond the Initial Interview*   *November 2014*
ECU ADRE 6320 (master's level) Family Treatment in Substance Abuse Rehabilitation

RESEARCH EXPERIENCE

ECU DARS   Greenville, NC
CACREP Accreditation Committee   *September 2015 – present*

ECU DARS & Division of Infectious Diseases and International Travel Health   Greenville, NC
Motivational Interviewing Research Assistant   *August 2014 – August 2015*

ECU College STAR   Greenville, NC
Research Assistant, Graduate Assistantship   *May 2014 – July 2014*

ECU Beginnings – Pregnancy and Recovery Clinic (PARC)   Greenville, NC
Research Assistant, Practicum/Internship   *August 2013 – July 2014*

LEADERSHIP EXPERIENCE

Pitt County Coalition on Substance Abuse   *February 2014 – November 2017*
Executive Board Secretary, *April 2016 – November 2017*
Student Board Member, *February 2014 – April 2016*

Licensed Professional Counselors Association of North Carolina   *January 2017 – October 2017*
Graduate Student Representative, *January 2017 – October 2017*

Professional Association of Rehabilitation Counselors   *March 2016 – March 2017*
Division President – General Counselors

Chi Sigma Iota International Honor Society   *February 2013 – January 2017*
President, *March 2013 – April 2014*

Student Addictions and Rehabilitation Association   *August 2012 – May 2014*
President, *May 2013 – May 2014*
Social Committee Co-Chair, *August 2012 – April 2013*

The College of Allied Health Sciences Student Leaders Council   *February 2013 – May 2013*
Department of Addictions and Rehabilitation Studies Student Representative

ADDITIONAL WORK EXPERIENCE

ECU Walter and Marie Williams STEPP Program   Greenville, NC
Biology Tutor, Graduate Assistantship   *August 2014 – December 2014*
Mentor and Academic Support, Graduate Assistantship   *August 2013 – May 2014*

ECU Department of Health Services and Information Management   Greenville, NC
Graduate Assistantship   *January 2013 – August 2013*

ECU Department of Athletics/Office of Student Development   Greenville, NC
Graduate Assistantship   *August 2012 – July 2013*

HONORS & AWARDS

American Counseling Association 2016-2017 Graduate Student Ethics Competition – Third Place Team Winner at the Doctoral Level

Licensed Professional Counselors Association of North Carolina's Nancy Howell Scholarship Award – Doctorate recipient for the 2016 award year

UNC Campus Scholarship for Doctoral Students – Awarded for 2016-2017 & 2017-2018 academic years

ECU DARS Doctoral Student Stipend and Financial Assistance Package – Awarded for 2014-2015, 2015-2016, & 2016-2017 academic years

Elizabeth "Beth" Lambeth Memorial Scholarship – Awarded for the 2013-2014 academic year

PROFESSIONAL MEMBERSHIPS AND AFFILIATIONS

Collegiate Recovery Community Ally *September 2015 – Present*

Licensed Professional Counselor Association of North Carolina – Student Member *September 2014 – Present*

American Counseling Association – Student Member *August 2012 – Present*

American Mental Health Counseling Association – Student Member *July 2016 – July 2017*

Professional Association of Rehabilitation Counselors – Student Member *March 2016 – March 2017*

RELEVANT TRAININGS

North Carolina Intervention (NCI) – A Training *July 2016*

Mental Health First Aid *October 2014*

Rapid HIV & Hepatitis Testing Training *March 2014*

Rethink: Psychiatric Illness Training *November 2013*

HIPAA, Bloodborne Pathogens, and Tuberculosis Trainings *August 2013*

Stewards of Children Child Sexual Abuse Recognition, Response & Prevention Training *June 2013*

REAL Crisis Center Volunteer Crisis Counselor Training *October 2012*